OCT 22 1920

THE LANCET.

A Journal of British and Foreign Medicine, Surgery, Obstetrics, Physiology, Chemistry, Pharmacology, Public Health, and News.

Telegrams—LANCET, WESTRAND LONDON *Telephone*—GERRARD 5356 *Offices*—423, Strand, London, W.C. 2.

No. XV. of Vol. II., 1920. No. 5067. Vol. CXCIX.

LONDON, SATURDAY, OCTOBER 9, 1920.

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An Introductory Address
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MEDICAL RESEARCH AND EDUCATION.

Delivered at the Opening of the Session at the Middlesex Hospital Medical School on Oct. 1st, 1920,

BY SWALE VINCENT, LL.D., D.SC., M.D., F.R.S.E. & C.,
PROFESSOR OF PHYSIOLOGY, UNIVERSITY OF LONDON.

IN delivering an opening address it is fitting that I should speak to you upon a topic in which we are all profoundly interested. I have therefore chosen the subject of medical research and education. It is obvious that in the time at my disposal it will only be possible to touch upon a few points. The history of medical education is fascinating and supremely instructive, but on the present occasion our discussion will perforce be confined to present-day problems. To many of you my subject, and possibly my treatment of it, may seem to be trite and commonplace, but to some of us the topic is ever the uppermost in our minds, and the nature of our life's work compels us to give it constant thought. My own justification for speaking to you on this subject is that I have for more than a quarter of a century been intimately associated with medical research and education in different parts of Great Britain and in Canada, and have also had ample opportunities of studying the methods employed in the United States and the continent of Europe.

The Fallacy of "Practical" Methods.

It is frequently urged that our medical education should be more "practical." In advocating or opposing this doctrine it is essential that we should understand precisely what is meant by the term "practical." If by it we mean "applied" or "professional," then the proposal to make our education and our research more practical is fraught with danger. On this point I should like to quote a passage from an address by Professor Pearce of the University of Pennsylvania:—

> "In recommending to you that, as practitioners, you keep always the point of view of the investigator, I realise fully that as you go out among so-called 'practical' doctors you will find many who sneer at what they term the 'scientific' doctor. This view, of which we hear less and less each year, is a survival of the opinion commonly held prior to the development of the sciences of bacteriology and physiologic chemistry, which sciences by their practical applications to every-day medicine have perhaps done more to dispel it than is usually realised. I may quote from the words of a past and present teacher in this school to illustrate this change in attitude. [Professor Pearce is addressing a student's society at Harvard University.] One, Oliver Wendell Holmes, in an introductory lecture to the class of 1867, discussed the question of whether or not the young physician should take an active interest in investigation in medicine. He expressed his disapproval in the words 'take down your sign or never put it up,' thus implying that at that time practice and investigation were considered incompatible. The same implication we find also in his frequently quoted phrase, 'if a man has not plenty of good common sense, the more science he has the worse for his patient.' Thirty years later we find your present professor of comparative anatomy summing up the matter in the statement, 'so far as I know, the most important difference between a "practical" doctor and the truly scientific is that the patients of the former are more likely to die.'"

Even from the narrowest utilitarian standpoint it is a shortsighted policy to be too "practical." By limiting too rigorously the scope of investigation, one runs a serious risk of checking discovery altogether. The whole of the subject of electricity, which now plays such an important part in our daily life, has been evolved, not by the "inventor" or by the "practical man," but by the patient and disinterested studies of such men as Faraday and Clerk Maxwell. Our knowledge of disease has been advanced in recent years not only by medical men, but by botanists, zoologists, and chemists. It behoves us not to regard too anxiously the immediate practical value of research. Most of the epoch-making discoveries have had for some time little or no direct application to medical practice. To our grandfathers nothing could have been conceived more improbable or even absurd than that a study of the different species of mosquitoes and their life-history could lead to the discovery of a means of abolishing yellow fever. We must even beware of undue haste in putting discoveries to use.

Even in the laboratory itself it is possible, by a too close concentration to one's particular line of work, to miss great opportunities of enlarging the bounds of knowledge. I have heard of a physicist who was interested in scientific photography and who noticed many years ago that his photographic plates always became fogged in the presence of Crookes's tubes, but who, *being a practical man*, simply took special care to keep his plates away from the tubes! This is an exquisite example of a too practical man who just missed through failure to keep his mind alert, one of the greatest discoveries of modern times, a discovery made some few years later by Rontgen of Wuerzburg. It is my opinion that it is not desirable to emphasise in a student's course the more purely professional part of his life's work. Throughout his after life he will have ample opportunity for making himself familiar with these matters, but he will probably never again have the chance of carrying out a chemical analysis, a physiological experiment, or a careful histological post-mortem examination.

If by a "practical man" we mean a doctor who is equipped by his training to apply promptly and efficiently such treatment as may be the best for his patient, then, of course, "the practical man" is the best kind of man. But it is my firm conviction that such practitioners can only be turned out by our medical schools if the education given is of the broadest and most generous type, and if we aim above all to instil into our students the true scientific spirit, so that they shall always regard their cases as problems, to the solution of which they are to give their utmost skill and energy, employing their mental tools as they have been trained to use them in their scientific studies.

Relation of Lectures to Laboratory Work.

As for the methods of our teaching, I fear there is need for great improvement. The formal lecture without demonstrations is a pitiable anachronism. It is a survival from the days when there were no text-books. Students nowadays hear so many lectures that they become almost immune to any influence in this direction. In the majority of subjects in the curriculum a short introductory course of about 40 lectures is all that is necessary or desirable. Advanced students should have the privilege of attending short special courses delivered by the staff or investigators on subjects to which the lecturers have devoted special attention. On the other hand, the time devoted to laboratory work should be considerably increased and the lectures ought to be to a large extent explanatory of the laboratory courses. Heads of departments would do well not to look upon practical classes as matters beneath their notice and not to leave them entirely in the hands of assistants.

A student recently told me that his idea of a teacher was one who would make his life a hell until such time as he knew enough to pass his examination. Now the student who holds such views is not entirely to blame for his state of mind. The medical schools have done much to foster a belief in the minds of students that their teachers are called upon to hold innumerable classes of the "grinding," "coaching," or "cramming" variety; and the schools have been tempted to do this out of a spirit of rivalry and competition with other schools, which it is impossible to justify. Tutorial or viva-voce classes are not in themselves bad, but the topics of discussion are so frequently those with which the students have no actual first-hand knowledge and deal with phenomena of which they can call up no definite mental images that this method of spoon-feeding becomes a serious evil. The more so, since students are tempted to neglect the systematic laboratory courses and trust to the help of the tutorial classes held just prior to each examination.

The separation of "theoretical" from laboratory courses has not tended to produce the best results. The text-books, "theoretical" or "systematic" as well as "practical," ought to be in constant requisition by the students while they are working in the laboratory.

There should be a departmental library conveniently adjacent, and students should constantly be referred to original articles in the journals and not merely to the compiled books. The reading and discussion of original work might often with advantage be substituted for the lecture.

Great improvement would result if medical teachers could be induced to study more carefully their educational methods. For example, students should be induced to see for themselves, and not always told what they are to see; they ought to be made to find out for themselves and not told what they must find.

Dr. Thomas Lewis very reasonably insists that much more attention should be paid to human physiology in class-work. The normal should be thoroughly known before the student passes on to the study of the abnormal.

Excessive and Defective Examination.

A large part of the trouble arises from our examinations. The evil results of excessive, and at the same time defective, examinations upon learning are nowhere more manifest than in medical education. The teaching is too frequently interrupted by tests. No sooner have the students settled fairly down to work than they begin to inquire, "Will this work pay?" "Shall I get this in the examination?" This spirit is fatal to sound learning.

But if examinations are an evil, albeit a necessary evil, how can this be mitigated? What are the alternative methods suggested of securing the ostensible objects of examination—viz., efficient study and competent teaching? In the first place, the external examiner must be abolished, and the teachers must be the examiners for their own students. A system of daily marking for observations made and for practical work done might with great advantage be substituted for the ordinary practical examination. Such examinations are of necessity very unsatisfactory. The tests to be employed are, from the nature of the case, very few, and must be well known beforehand. If a student be asked in an examination to conduct an experiment, even of the simplest nature, which he has not had the opportunity of rehearsing, then complaints and protests arise both from candidate and university authorities. The majority of our tests in laboratory work have to be directed, not towards estimating a candidate's power of solving a problem, but rather utilised as a means of judging his power of remembering how to repeat proceedings which he has carried out several times before. From an educational standpoint such tests are valueless.

A few more words on the bugbear of examinations. Some are an utter farce, and others are so bad that teachers and students alike have lost faith in them, even in those cases where tradition compels them to present themselves. It is a source of infinite confusion that the students in a medical college are divided up into several groups, with aspirations not to learn different branches of the subject, but to pass different kinds of examinations. It frequently happens that a large part of their energy and ingenuity is directed towards studying the idiosyncracies of the various examiners and in reading their text-books. When this kind of "preparing for examination" extends to the teachers themselves the limit of educational depravity has been reached. Much of the evil would be eliminated by abolishing the external examiner and giving credit for regular class-work. One of the functions of a medical school is to train competent practitioners of medicine. But it cannot be too strongly urged that this is not its only function. A medical school worth the name must add to our stock of medical knowledge and must rear a number of young men to become teachers in the medical departments of our universities.

Every Teacher an Investigator.

Teaching, in my opinion, should not be divorced from research. Every teacher should be also an investigator. "To engage conscientiously in teaching is a form of research." Lecturing is a valuable means of arranging one's ideas, and in facing a keen and critical group of students the lecturer is frequently impelled to a more careful and discriminating treatment of his subject. It has been pointed out also "that in the stimulus of talking very often new and useful points of view present themselves." I have heard it recommended that the lecture hour be regarded as an agreeable relaxation for the lecturer and a period of refreshing sleep for the students. But I venture to think that if the lectures be not too many and if they are of the character I have suggested, even these laudable purposes fall into a secondary position. If the teacher be also an investigator it will make a great difference to the nature of the teaching. The best students are invariably turned out by men actively engaged in research. Such men are constantly on the alert for new methods both in their investigations and their teaching, and they inspire the same alertness in their students.

The younger men who act as lecturers and demonstrators in university departments deserve special consideration. Rarely can such young men succeed in carrying on fruitful scientific work unless the head of the department sets the example and lends his encouragement and advice. I have known several instances where a professor has, in the course of years, had numerous assistants with enthusiasm and capability for research, but it has been urged that "there was no time" for research, "teaching was so much more important," and any suggestion of investigation on the part of the assistants was discouraged, or the attempt forbidden. The young teachers trained in such departments frequently obtain a reputation for being "good teachers," which too often means that they develop a marvellous capability of pushing bad students through worse examinations, The best teaching can only be carried out in an atmosphere of research. The view has sometimes been expressed that a really efficient teacher should confine his attention to teaching. A moment's consideration will show how vain a thing and how fondly imagined is this. Examine a modern text-book in any subject and investigate the method of its compilation. The portions which treat of recent advances must consist largely of extracts from recent monographs or contributions to the scientific journals. Surely it is well if the lecturer has himself obtained first-hand knowledge of some of these advances, and better still, if he has made some of them by his own investigations. The only satisfactory method of gaining a clear comprehension of any subject is to study the original sources of information and patiently strive to add to the sum of knowledge. It has been very truly said that "a teacher who devotes an inconsiderable part or none of his best hours to research, cannot long hold his place as a fertile and effective teacher."[1]

Every teacher knows that his lectures are infinitely more inspiring when he is speaking upon those branches of his subject on which he has worked, than when he is talking of matters with which he has only second-hand knowledge, for no one can personally verify all the facts of his science. There is a vast difference in treatment in the two cases, and students are not slow to detect it. A student who knows that he is receiving his instruction in an active research department receives an inspiration which takes him on into his every-day practice with a true scientific spirit. The student in the other kind of department has no impetus but to learn enough to pass his examinations. It follows from what I have said that the medical school which encourages research in all its departments will always attract the best students.

Separate Research Departments Unnecessary.

Separate research chairs and research departments or institutions are, in my opinion, unless in quite exceptional cases, undesirable. Even in purely technical or applied science it is now being generally recognised that the best original research is to be looked for in teaching institutions. The establishment of research institutions by the Government and by private munificence is likely to draw off the best men and the highest class of work, and to leave research in the universities in a deplorable condition.

Let us consider for a moment how the necessity of such research posts has arisen. There can be no doubt that in the past heads of departments have been appointed who had no capability or no desire for original investi-

[1] Clifford Allbutt: Brit. Med. Jour., Oct. 14th, 1905.

gation, and to obviate the disagreeable necessity of getting rid of such men, new chairs, departments, or even institutions have had to be created in order to ensure that some adequate investigation may be carried out. This is, in my opinion, a thoroughly bad policy. By such an arrangements the students lack the proper inspiration which is derived from an active worker who is also an enthusiastic teacher, and the pure investigator misses the opportunity of formulating his rapidly acquired new views. It is of the greatest profit to students to be kept in constant contact with the growing edge of the subject. It is often possible to utilise the advanced class-work as a means of investigation. I therefore strongly advocate that every department in a medical school should unite teaching with original investigation. In order that this may be achieved it is all-important that the teacher should have abundance of free time for thought, for reading, and for experiment. If his time be filled up by endless elementary classes or administrative work he cannot be expected to contribute to the advance of knowledge. There are two ways in which more free time may be found for the prosecution of research—namely, the increase in the teaching staff and the creation of new departments. Research in our medical schools will be considerably advanced with increased recognition of the hospital as the homologue of the research laboratory in general science. It has been pointed out over and over again that the essential, fundamental methods of experimentation have not yet been diffused to a sufficient extent into the regions of practical medicine.

Perhaps the quality most essential for successful investigation is enthusiasm. This must constitute a stimulus powerful enough to sustain the worker through long periods of laborious drudgery, when apparatus will not work, when all goes wrong, and the outlook seems hopeless. Every director of a scientific laboratory must have realised that the qualities of enthusiasm and dogged perseverance are just as valuable in scientific work as those of "brilliance or cleverness." The educational value of original research is immense. A new man is created whenever a student, free from the terrors of examinations, has devoted himself to an experimental problem, and has carried it to a successful issue. Such a man is better able to attack the problems of his everyday medical life and to cope with emergencies, than many of his fellows who may have read more books or passed severer examinations.

Elasticity in the Medical Course.

I am persuaded that nothing but good could come of a greater freedom and elasticity in the medical courses. Students should have a greater latitude of choice in subjects to be pursued, though, of course, certain fundamental subjects must always remain obligatory. It is generally recognised that the curriculum is sadly overburdened and the elective system is, to my mind, the only practicable method of relieving the strain. This system would have the additional advantage of permitting every student to do some kind of research, and so to increase materially his mental calibre and equipment. As an example of the elective system applied to the subject of physiology, we might suggest that all students should attend a general course of 40 lectures. Then, in addition, the department should provide short courses of eight to ten lectures with laboratory work (by people specially competent to deal with the particular subjects) in general physiology, physiology of the circulation, the nervous system, and so on. No student should be required to take all these courses, but only a certain number. The same arrangement might well be applied to other subjects, and to groups of subjects.

Let us turn for a few minutes to the organisation of departments and distribution of subjects among the various teachers. I venture to suggest that the ordinary course of histology for medical students should be transferred from the department of physiology to that of anatomy. Biochemistry has now grown in extent and importance to such a degree that it can no longer be conveniently housed in the department of physiology, nor can it, in my view, be adequately taught by a professor of physiology who is at the same time responsible for the subject of biophysics or experimental physiology. The proposal does not necessarily mean that microscopical anatomy and physiological chemistry are to be entirely divorced from physiology. There should be a large amount of coördination and coöperation between these separate departments, and where satisfactory subdivision cannot be achieved a little overlapping will do no harm. I am aware that some of my physiological colleagues do not agree with the proposal to separate histology and biochemistry from physiology. The arguments put forward in favour of the retention of these subjects by the physiologist might, I think, be urged with equal force in regard to a large part of human and comparative anatomy, organic chemistry, and physics. I venture to prophesy that in the evolution of our curriculum there will be a general if not universal adoption in England of the arrangement suggested a few minutes ago, and which has been found most advantageous in the universities of the continents of Europe and America.

A matter which requires very serious consideration at the hands of the authorities of our medical schools is the desirability or otherwise of a more careful selection of our students and of some method of eliminating altogether those who prove unsatisfactory.

Finance the Great Hindrance.

Perhaps the greatest hindrance to progress in medical education has always been, and still continues to be, the difficulty in finding money to defray the expense of buildings and laboratory equipment, to say nothing of the salaries of teachers. Although we must record a debt of great gratitude to the few generous and high-minded men who have endowed chairs and even institutions, yet we have every reason to be ashamed of the lack of wide public support to our universities. Successive Governments have left our educational institutions on the verge of starvation. The universities are not the offspring of our Government, but since they have been left on its doorstep without proper means of nutrition, it will be compelled in common decency to take them in and adopt them. No university can be self-supporting, and private munificence is too hazardous to be relied upon. I wonder if it has ever occurred to any of you, or if it has ever been laid before you, that a scientific man is the only servant of the nation who is expected to do his work without proper appliances. A business man has suitable appointments and fittings adapted for saving of time and perfection of technique, but a scientific man has in many cases to be content with the most miserable makeshifts. Within the last few years the conditions have somewhat improved in respect of those subjects which are recognised as valuable in the pursuit of war and the amassing of wealth. In medicine our Government has preferred to endow separate research institutions rather than to support the medical departments of universities. The director of a university laboratory is indeed supremely lucky if his place of work is as well adapted for its purposes as a bank, a departmental store, or a hotel kitchen. This deficiency is painful enough in many of our larger universities, but what is the state of affairs in our smaller institutions can only be left to the imagination of those who do not know by bitter experience. The reason of this deplorable condition is clearly to be sought in the lack of interest in and appreciation of scientific work on the part of the general public and the reflection of this state of affairs in the attitude of our Governments. In regard to medical education, the public has never realised that efficient training of doctors is absolutely dependent upon a sound scientific education. And this is perhaps not to be wondered at, since medical men themselves have not always held the most enlightened views on the subject. This is, of course, only an expression of the British suspicion and scepticism as to the value of science. There has been a partial awakening, but our poverty-stricken universities still stand as a sign that everything has yet to be done. State support to the universities should be generous and complete. Teachers should be well paid and laboratories well endowed.

Here in London all our schemes and proposals are baffled and defeated by lack of funds, by ancient tradition and the weight of great vested interests, combined with the evils of our examination system.

An Introductory Address
ON
SCIENCE AND THE ART OF MEDICINE.

Delivered at the Opening of the Session at St. Mary's Hospital Medical School, London, on Oct. 1st, 1920,

BY GEORGE ADAMI, C.B.E., M.D., F.R.S.,
VICE-CHANCELLOR OF THE UNIVERSITY OF LIVERPOOL.

[AFTER introductory remarks addressed specially to the students of St. Mary's Hospital Medical School, Professor Adami continued :—]

The Present Financial Straits of Universities.

I want to-day to take up as my special text this matter of initiative and independence, for there are words of warning which I think need to be uttered. The universities and the professional schools of England find themselves to-day in a parlous state; never, indeed, has their condition been more parlous. Students are pouring in to all the professions in numbers double those before the war, the demand for extra accommodation is most urgent, and the cost of providing that extra accommodation has soared to an unheard of height. Like coal-miners and bricklayers university teachers must live, even if they manage to exist at stipends well below the wages received by the said coal-miners. So great has been the increase in cost of living that whereas before the war a junior member of the staff was content with £100, his personal fortune, what he could make by the side, and his expectations—to-day with the rise in the cost of clothes, lodging, and boarding, £250 is the minimum that suffices, and even then secondary schoolmasters with three years' university training are receiving as much and more. Think a little and you will realise how heavy is the additional strain thrown upon the medical school, especially when increase in the students demands increase in the junior staff in all departments. But this is far from being everything. There is to be considered the heavy increase in the wages of the administrative staff, the huge increment in the price of supplies, microscopes and other apparatus, drugs and glassware and chemicals. The cost of running a medical school has risen by leaps and bounds. Simultaneously the income-tax has soared to an appalling height, and on top of it for business men the excess profit tax is eating the heart out of progress. Is it any wonder that the erstwhile wealthy supporters of hospitals and medical schools feel so sorry for themselves as to hold that charity begins at home, more particularly when a paternal government declines to recognise that gifts made to national objects should be devoid of tax, or thinks it has done all that is possible in making 12½ per cent. of such gifts free from excess profits duty. 12½ off 60 per cent.!

Is it a wonder that with expenditure rising rapidly quarter by quarter, and income as steadily sinking, the universities and professional schools of this country are in despair? Is it a wonder that realising the public duty performed by them, and knowing that in other countries like France and Germany the State has for generations assumed the cost of university and professional education the universities in their distress should turn to the Government and appeal for further aid?

So the Vice-Chancellors and the university authorities and representatives of the teachers went before the Chancellor of the Exchequer and the Minister of Education this summer and placed part of their case before him, only to be told—what was quite true—that he had done more to aid the universities of England than any previous Chancellor, that he was at his wits end to meet the financial needs of the nation, and that he could do nothing for those who did not help themselves. Everything had risen in price, even the 1*d.* postage stamp now costs 2*d.*, but what university had raised its fees? And he as much as directed us to raise our fees, and only when we had done all that was possible to secure income from other sources to come to him again. And like Paul, or Saul, Mr. Fisher was there consenting.

Immediately following this pronouncement the council of my university, just as did that of the University of London, resolved to follow Mr. Chamberlain's bidding. We sent to each student, present and prospective, a notice as to our decision. We wrote to the local papers a reasoned letter pointing out how the price of everything had increased, how before the war the student only paid between a quarter and a third of the actual cost of his university education, the greater portion of the cost being met by the endowments of great-minded citizens for buildings, equipment, and professorial chairs, by local grants and Government grants, and how, faced with a heavy deficit, we were forced to take these steps, adding that the University would do its best to aid deserving cases. And the response was all that could be desired. I did not receive a single letter from parent or guardian or student claiming an implied contract. All admitted that we had taken the right course, even though thereby they were hard hit.

Here is the tragedy. As a loyal and public body our University responded with open arms to the request of the Ministry of Education that we should accept ex-Service students; we accepted them to the very limit of our capacity, we refused overseas and other students on the ground that we held it our first duty to accept those who had served the country. Our last thought was to take advantage of the Government. We debited the Government for each student the same low fees asked from ordinary students; when the Ministry was painfully long in paying the maintenance grants to these students we became a loan office, advancing to the ex-Service students sufficient to carry them over their difficulties. We charged the Government nothing for this accommodation. For the office work and clerical help required to look after the affairs of 1100 and more ex-Service students we charged the Ministry much less than our expenses. To accommodate the hundreds of these ex-Service students we filled every available inch of space with wooden huts-ments at heavy cost, and at yet heavier cost equipped them, again without specific Government aid. And now when we carry out the directions of the Chancellor, the Minister of Education consenting, and advise the Ministry of our action, we are told very decidedly that the Ministry will not meet the increase in fees for these ex-Service students already on the roll. Before taking action we had carefully calculated what addition would wipe out the estimated deficit for the coming year. Our University is proud of its past record of never having been in debt. Thanks to this decision of the Ministry we now, what with ex-Service and Training College students, face a deficit of what is nearer £15,000 than £10,000. And what is the worst part of the situation is that our other students, those not receiving Government aid, when they hear that Mr. Fisher declines to pay the increase for ex-Service students, must inevitably doubt our bona fides and will be incited to claim like consideration. For having carried out to the fullest the advice of the Chancellor of the Exchequer we find ourselves, through the action of another Department, placed in a most embarrassing position, unless with the full facts before it the Ministry reconsiders its decision.

Drawbacks of Government Control.

Let me say that as a Vice-Chancellor I am upon principles strongly opposed to seeking help from Government—that I found myself in cordial sympathy with Mr. Chamberlain in his answer to our deputation which had asked him to give the same treatment to university staffs as it did to school teachers. It was a statesmanlike survey of the situation. As the Chancellor pointed out, what through the generations had distinguished English universities and university staffs had been their independence of Government and Government control. As a consequence each has developed along its own lines according to its particular environment. Our universities have been built up by private beneficence.

As academic head of my University there is nothing of which I am more proud than of the way in which within little more than one generation the citizens of Liverpool, in their large-hearted generosity and wise foresight, have built up a great institution that serves not the city alone but all the surrounding district, from North Wales to Cumberland; aye, and already through its Schools of Tropical Medicine and Architecture and of Physiology under Sherrington (now transferred to Oxford), we have been of Imperial service, drawing students from far and wide. Mr. Chamberlain did well to compare the results of English University education with those of the German system, to compare the sturdy independence and resultant initiative of the British system with the formalism and repression of the German machine system. In three years the English scientists not merely caught up to but in every instance advanced further those positions in what I may term offensive science gained by the Germans through 30 years of laborious effort. It was through their subservience as Government officials that the Prussian and Prussianised professors supported the military caste in leading Germany headlong into disaster.

It will be an evil day for England when our universities and, I may add, when our hospitals come under Government yoke. If we are forced to ask aid from Government, let it be with a clear understanding that this is but temporary, let it be with definitely expressed conditions that our hands are not tied, and that the officials of Whitehall are not empowered to interfere. Let the grants be of such a nature as not to give excuse for interference. These may seem almost impossible conditions, yet they may be fulfilled. If, for example, the Government gives grants in aid to individual scholars as it does at present with ex-Service and training college students, if for these it pays to the universities the same fees as those exacted from ordinary students, such action gives it no right to interfere in the affairs of the university or school. If, on the other hand, the Government were to pay the pensions and superannuation grants of university teachers, that would give it the right to determine what staff the university shall possess, the lines on which the university shall expand, the stipends it shall pay. It would convert the professors into Government officials. Or, again, if the Government makes a grant of so many thousand per annum to the university, that act gives it an absolute right, nay, a positive duty, to supervise and direct the spending of the grant. To-day we may be so fortunate as to possess in Mr. Fisher a Minister of Education of the most distinguished university standing, the first expert in education to be appointed to the post, a Minister of the highest ideals in whose hands the universities are absolutely safe. But what about his successors? What security shall we possess that those successors do not leave us wholly in the hands of Whitehall officials? To-day, let me admit, there is an admirable spirit among all at the Ministry of Education. But how long will it last? Timeo Danaos et dona ferentes. Nor with the University Grants Committee can we always have Sir William McCormick with us. Already you, the medical schools in London, have your experiences. I need not mention here the names of certain unfortunate schools, which in their mingled innocence, poverty, and cupidity, accepted Government grants and forthwith fell into the toils and are now as defunct as the leaves of yesteryear; unable to fulfil the conditions imposed upon them; killed by kindness. I confess, too, that I am more than a little nervous about the present strong movement, I will not say directed from Whitehall, but which has been blessed by Sir George Newman, a movement in which Whitehall may be said to take a strong paternal interest. I mean the movement for full-time professorships in Medicine, Surgery, and Midwifery, and the development of the unit system.

The Development of the Unit System.

Let me crave your patience to dwell upon this matter for a little while. Admittedly this movement has reached us from America, and the apostle to the Gentiles in this case was Mr. Abraham Flexner, himself not a medical man, but one who, acting on behalf of the Carnegie Foundation, had in his Report upon Medical Education in the United States utilised the data collected by a committee of the American Medical Association to such good effect as to produce an astounding and most healthy revolution. It is difficult for us in this country to comprehend the state of affairs revealed by that report: the existence of three, four, and five schools in one city, each giving its dêgree in medicine; of schools without laboratories, without dissecting-rooms, without hospitals; of schools innumerable whose students were not permitted to enter the hospital wards, gaining all their knowledge of clinical medicine and surgery in the medical amphitheatre into which the patient's bed was trundled, in the operating theatre, where similarly they viewed everything from the benches, and in some poorly equipped out-patients' clinic. There were night schools of medicine, where Government clerks and others employed during the day could obtain a licence to practise after a three or four years' course, and eclectic schools galore—physio-medical, homœopathic, osteopathic, and the like. And at the other end of the scale were schools like Johns Hopkins and Harvard, magnificently equipped, with endowments, hospitals, and buildings on a scale which we in England cannot approach. As a result of that report, published less than ten years ago, the number of medical schools in the States, with its hundred million of inhabitants, has dropped rapidly from 148 or so to under 80. In ten years half of the schools operative in 1910 no longer exist.

One of the many movements of reform during this period has been the establishment of full-time chairs in the major subjects. The movement was initiated early in the century by a memorable address delivered by Dr. Llewellys Barker, author of the well-known work on the nervous system, at the time professor of anatomy at Chicago. It was some years before any university or school was in the position to take action along the lines laid down by him. The first in the field was Johns Hopkins, where in the meantime Dr. Barker had succeeded Osler as professor of medicine, and by a painful nemesis Dr. Barker was the first to have to decline to give up private practice and take up a full-time professorship. Since then Harvard and several other leading universities, with local modifications in the plan, have joined in the movement. A popular modification is that which permits the professor to have consulting-rooms in the hospital, where at stated but limited hours he can be consulted by private patients. With this a certain number of private beds in the hospital may be allotted to him, although consultations at a distance are forbidden. Thereby the whole working day is spent in the hospital precincts. It is this system which was described and extolled by Mr. Abraham Flexner before the London University Commission, and it is to establish this system that to-day the Ministry of Education is willing to contribute very material aid. Is the time ripe? Is it advisable? Can this system of German origin be securely grafted on to our English method of teaching medicine?

Its Results in North America and Germany.

In the first place let me point out that, however admirable it may appear in theory, in practice among the English-speaking peoples it is still in the experimental stage. Certainly the impression that I have gained discussing the matter with leaders of the profession in the States is far from being one of unalloyed satisfaction. Even those who in their loyalty to their schools and the profession have accepted these full-time posts have not spoken with unreserved content, unless they were young and full of enthusiasm, promoted to these posts because of their high promise, without extended experience of practice in the outer world, to whom appointments meant very definite promotion. At this stage it seems to me it would be wiser to let others make the experiment and observe the results.

I remember so well in the early "nineties," shortly after going to Canada, my elation over the progressiveness of the country of my adoption in inaugurating electric tramways in all the big cities. I remember the years that elapsed before England on any large scale followed suit: the supreme contempt of my young

daughter, who had never known other than electric cars, upon arriving in London, at Liverpool Street I think it was: "Why they have horse cars!" This after I had taught her that London was the first and greatest of all cities. And then when after leisurely years electric traction was established in the great cities of England, my discovery that in road-bed and smooth running, in the construction and amenities of the cars, England was far ahead of anything in the States or in Canada. She had waited and investigated and benefited and come out on top. The delay had done no harm. On the contrary.

Next, how has the system succeeded in Germany? There for generations the universities have possessed full-time professors appointed and paid by the State in all the main departments. What have been the results? The results it seems to me have been very significant, not to say sinister; such results as none of us wish to see accrue in these isles. Admittedly, the professors have devoted themselves to the wards and to the laboratory; the study of individual cases and individual conditions has been intense; there has been nothing like it in this country; the output of papers has been remarkable. If classification and mastery of detail is science, then assuredly Germany during our lifetime has been par excellence the home of scientific medicine. If, on the other hand, not mastery and classification of detail but the deduction of broad principles from those details is the highest form of science, then it is not a little remarkable that the great advances in medical science of the last century have come not from Germany but from outside Germany—they are anæsthesia, antisepsis, and asepsis; the development of neurology, from the recognition of motor and sensory nerves through the work of Gull, Hughlings Jackson, and Ferrier, to the latest studies of Sherrington and Head; the recognition of the internal secretions, of hormones and vitamines; cardiac physiology—and I might give you a lengthy list. The Germans have, it is true, excelled in detailed studies of particular diseases, but where they are to be credited with notable discoveries it is not a little noteworthy that those whose names are known to all are not the university professors of medicine and surgery, are not the clinical but the laboratory men—men like Virchow, Koch, and Ehrlich.

We have to acknowledge that great men of original mind are few and far between, but the less trammelled English system has favoured their development, whereas the German system has repressed it. During my generation, without any full-time chairs of medicine and surgery the brighter and keener students have obtained for themselves most of the advantages claimed for the unit system; they have spent years in preparation for their life's work, they have been for years at physiology, anatomy, pathology. If their school did not give them opportunities they have gone abroad to work and obtain inspiration at the leading centres. What has been the weak point in London has been the intense competition which has made a man fearful to leave his school for six months or a year lest someone should in the meantime seize a vacancy and gain seniority. A wholly mistaken policy, for the man of adventure who does good work abroad and gains new ideas is safe to be recognised and to make his mark. But it is very striking how the great men in our profession during our lifetime have been not those who confined themselves from the first to clinical medicine, but in medicine those who spent years over pathology, in surgery those who similarly spent long years in the dissecting room—Bright, Addison, James Paget, Andrew Clark, Samuel Wilks, again I could lengthen the list, were all devoted to the post-mortem room and the museum. In our generation you will find that it is those who have gone for special work abroad, or worked in other schools, who are the notable men in the profession. There is more than one way of obtaining a sound medical education and of preparing for advance.

English and German Systems Contrasted.

Here I may note another weakness of our English system; it makes for the solitary leader, not for the establishment of schools. Men like Bright and Addison, and even those of yet greater calibre like John Hunter, remained isolated, and had no successors to maintain their tradition. The most their hospitals could do for them was to put them on the senior staff, to become forthwith involved in a fashionable practice, and when they died not their best pupil but the next on the staff in seniority, the one of all others least likely to have acquired the master's tradition, carried on the hospital work, and he might be of little account. I do not say that the English system is perfect or incapable of being improved. Very far from it.

But let us now turn to the tendencies manifested by the German system. The professor, highly trained, is appointed head of the clinic; he must show himself worthy of the choice, nay more, he must seek to be promoted to a higher position as head of the service in some more important university. How is he to do it? To make a reputation as a great teacher takes years, and then for Government officials in whose hands promotion lies, it is only a matter of hearsay; whereas if the teacher and his staff turn out a succession of papers, all published as emanating from his clinic and with his imprimatur, the very volume must in time make an impression, and his name will be kept before the medical world. The first duty then of the professor and his assistants is to publish. Each individual admitted to the wards inevitably comes to be regarded not so much as a human being, needing sympathy and help, as material for publication—as a case pure and simple. There, to anyone who has visited the great German hospitals, is the outstanding difference between English and German medicine. Here the human being is the first consideration, in Germany and Austria hospital patients might altogether too often be so many animals. Heedless of modesty and natural emotion man, woman, maiden, and child are ordered to expose this part or that to the crowd of students, are subjected to this or that test. They might be a herd of cattle or a company of Prussian privates. Ask anyone who has been at the Allgemeines Krankenhaus at Vienna if this is an exaggeration. The ideal physician, it has been truly said, is he who knows and makes it his duty to treat the *patient* and not the *disease*.

It may be said that this is only one manifestation of national spirit—that such things could never be in England. Perhaps so; but this also I will say, that the student trained by those who are in daily touch with private practice must learn from them the approach to the patient—must learn what, reading his reports, Abraham Flexner does not yet seem to have discovered, does not once mention in appraising what is best in medical education, that knowledge of instruments of precision and of exact methods of diagnosis is by no means the whole corpus of medicine; that, call it what you like—applied psychology, personal magnetism, the understanding of the character of the patient, the establishment of trust and confidence in his or her medical adviser on the part of the patient—is of prime importance.

The Dangers of Specialisation.

It cannot be gainsaid that where the object of a service is not primarily treatment but research and the advance of scientific medicine, and where the head of the service and his leading assistant are cut off from private practice, there must be a singularly strong temptation to regard the ward patients as cases. Further, the students admitted to the wards, the picked students more particularly, who study the cases under the chief and the first assistants and take part in the observations—these students will be brought up with what we in this country do not regard as the highest ideals.

Here is another weakness in the system that is most pronounced in Germany—namely, for the promising student alone to be considered and the ordinary every-day student to be neglected. The German youth leaves the gymnasium far more highly trained than the English boy leaves school, but his general training in the medical school is not nearly so sound and thorough. There is not nearly the same amount of

practical laboratory work or work in the wards; he may or may not take up practical histology; the practical physiology course may last three, six, or nine months, as he pleases; he can devote himself, if he likes, to a restricted group of subjects and do little or no practical work in the others; nor is there any adequate system of practical examinations. As a result, the ordinary product of a German medical school has had a far less thorough and all-round general medical training than has the English medical student—he is a poorer practitioner. This is all an outcome of the same system. We in England feel the responsibility of the school towards the whole body of students; our first duty to the State is to turn out a good well-qualified practitioner, our second to encourage and help forward the man of special qualifications. If we establish the unit system, we will encourage the German defects—namely, neglect of good general all-round teaching for all, and overmuch encouragement of the student to specialise too early in his career.

I will not dwell upon the exceeding great difficulty of grafting the unit system with full-time professorships in clinical subjects upon the old-established hospital staff system. That is obvious to all. I would only say this, that whereas we may meet with exceptions with those who, having made a high position for themselves and already endowed with a sufficiency, are willing to eschew private practice and devote their days to the hospital, nevertheless so great is the difference between what the university or the school can offer as a stipend and what a consultant of the first class can expect to make in practice, that inevitably the tendency will be for the full-time posts to fall to young men of promise—young men of 30 or thereabouts—who will take and hold these posts for ten years or so until they have made a well-deserved reputation. Then the temptation will be great to take advantage of that reputation and reap the benefits of the same in consultant practice. This appointment of young men to the position of highest standing in the school will not make conditions easier for the older members of the visiting and teaching staff in full practice, who must from all considerations be retained. Altogether you will see that, though throughout my life I have been a laboratory man and keenly interested in medical research and the advance of scientific medicine, I am very doubtful as to the wisdom and practicality of the establishment of the unit system in England. I am as doubtful to-day as I was ten years ago when I took up this subject on a similar occasion at the University of Toronto and made a like comparison between English and German systems. All these years I have seen no occasion to alter my judgment.

Pathological Department as Guiding Centre.

Why, finally, I would ask, adopt this German system, which has come to us through the United States, when there is an English method, a method the beginnings of which are in action here in St. Mary's? If you want to develop the study of the science of medicine, and surgery, why for Heaven's sake pass over the one department of the medical school specially devoted to the scientific aspect of medicine, to the study of the causes, the progress, and the results of disease—namely, the pathological department, a department headed and manned by a full-time expert, and that, I may add, on a strictly moderate stipend, by one of a group of men who have in their love for science voluntarily accepted the simple life with all its privations? You have made a start here at St. Mary's. You have established a pathological institute at the service of the whole hospital, to which members of all departments can apply, and it owes its inception to one of the greatest and most practical of pathologists, through whose work St. Mary's is known the world over. What is more, you have put aside beds in the hospital and given these into the control of the pathologist.

There is the British and the rational solution. You only need to add to that, under the pathologist as director, laboratories of pathological chemistry and of clinical or applied pathology to have all the equipment that is desired, unless, perhaps, following in this the lead of Edinburgh—for pathology does not deal with treatment—you establish a parallel Institute of Therapeutics and Pharmacology with a similar director of the Laboratories of Experimental Pharmacology, and with beds in the hospital. It may at times be necessary in pathology to follow the Edinburgh example in therapeutics and to make two appointments, a director head of the department and working with him a clinical professor; but this is a secondary detail.

Another suggestion I would make, based upon my experiences at McGill University: in association with the school establish a laboratory of experimental medicine and surgery, with a director chosen by themselves from among the junior attending staff, open as by right to all members of that staff, there to undertake experimental work at their own volition, subject only to the nature of the proposed work being first reported to a small committee of senior members of the staff and approved by them—a laboratory with fully equipped preparation and operation rooms, with trained nurse and laboratory attendant. At McGill work of the first order was done under these conditions, which, it seemed to me, would never have been undertaken otherwise.

These Institutes of Pathology and Pharmacology together should fulfil all that is necessary. It is understood that the institute is both for teaching and research—that the director, either himself or through a paid full-time assistant, should have charge of the wards assigned to him, with the power of filling the beds with particular orders of cases, medical or surgical, according to the condition or conditions under special investigation for the time being. The experience at the small special hospital under Dr. Strangeways outside Cambridge, the first of its kind, is that patients will come from all over the country when assured that there will be an intensive special study of their cases.

One more word: To assure the possession of a thorough knowledge of modern methods of diagnosis, chemical, physical, and serological, those recent graduates appointed to resident posts should spend a preliminary period of six weeks or three months in the pathological institute before undertaking their special work in the wards, and, further, while residents they should be given places or tables in the institute, there to carry out such examinations and analyses as are asked for by their chiefs.

The grave mistake made in Germany, and following Germany in too many schools here and in America, has been in establishing the pathological laboratory away from the hospital. This and the divorce between pathology and bacteriology, and placing the teaching and research in the latter under the chair of hygiene, explains the barrenness of academic German pathology during our generation. It is the hospitals and the living, and an intimate knowledge and comparison of symptoms in the living with the findings in the post-mortem room, that keep pathology a live subject, and to-day certainly it is the problems of infectious disease that are most fertile. Pathology, let me remind you, is the whole scientific investigation of disease, not as Virchow, and following him Germans in general, consider it—merely the restricted field of the study of dead tissues—the gross and minute morbid anatomy.

I am, or I was, a pathologist, but in my present position I have no axe to grind. I can speak freely, only assuring you that throughout my course I have fought for the wider, more liberal conception of my subject. It is with this wider conception that the Institute of Pathology should become the centre for scientific research in connexion with the wards and the individual patient. Once this Institute of Pathology or Institute of the Science of Medicine takes its right place in the school in closest association with the hospital and with every department of that hospital; once the staff become accustomed to turn to it for the solution of their problems, then surely, with all the junior members of the staff trained in that institute, within ten years the whole staff will be animated and leavened with the spirit of the science, over and above but not excluding or even damaging, the spirit of the art of medicine. That is the true education, tota, teres, atque rotunda.

THE VALUE AND INTERPRETATION OF SOME PHYSICAL MEASUREMENTS.

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OF recent years two particular methods of measurement, devised to assist in the assessment of physical condition, have been developed by medical physiologists: (*a*) the comparison of the vital capacity with the dimensions of the body devised by Professor Georges Dreyer; (*b*) the measurements of expiratory force and breath-holding due to Wing-Commander Martin Flack. The former is described in a publication by Professor Dreyer,[1] who has devised a series of ratios between vital capacity, weight, and sitting height (stem length), and he asserts that the numerical values obtained by these ratios constitute a scale upon which individuals can be placed in order of physical fitness.

In the case of candidates examined for air-pilots' certificates, the order of fitness given by the Dreyer ratios did not correspond with that suggested by the Flack tests. The data in respect of individuals were exact and fully recorded. It therefore seemed to the writers desirable to carry out an investigation with the object of finding some method by which the tests could be brought into agreement, as both sets of measurements were considered to give information of great value as to the physical condition of the respiratory organs.

The results of these investigations are given in this paper; each set of measurements has been formed into a product, and a graphical method of combining the two products into a single numerical result has been developed.

Available Data.

Flack's chief respiratory tests are now so well known that anything in the nature of a full description is unnecessary. The details of their practical application are given in the publications of the Air Medical Investigation Subcommittee of the Medical Research Committee. Briefly, they comprise:—

(1) The breath-holding test, in which the subject is asked to expire as deeply as possible, and then to fill the lungs fully, and to hold the breath (with the nose clipped) as long as possible. The time is recorded in seconds from the moment the nose is clipped until the subject has to take another breath.

(2) The expiratory force test, in which the subject has to blow a column of mercury in a U tube as high as possible, the result being recorded in millimetres of mercury.

(3) The fatigue test, in which the subject using the same U tube is asked to empty the lungs, fill up, blow the mercury to a height of 40 mm., and hold it there without breathing for as long as possible, the nose being clipped. It may be advisable to remark at this stage that the expiratory force test has been adversely criticised on the ground that knack largely affects the results. As will be seen later, the possibility of this has been taken into account.

Of the Dreyer tests it may be noted that in his paper Professor Dreyer states that when the weight in grammes is raised to the power of $\frac{3}{4}$ (or more accurately 0·72), is divided by the vital capacity, a normal constant for individuals of the same class will be obtained whatever their age, weight, or height; and that variations of more than 10 per cent. from this normal indicate abnormality. Also that the square of the sitting height divided by the vital capacity gives another constant, which should not show marked variations in healthy individuals. The remaining relationships of body dimensions suggested by Professor Dreyer may be given here although, in the majority of the calculations carried out, the first two have been chiefly used. In these formulæ W = weight in grammes; λ, sitting height; Ch., chest circumference; and V.C., vital capacity. These constants are those found for a large series of healthy Oxford undergraduates, who may be regarded as a type comparable to candidates for flying, and therefore capable of application to the cases discussed in this paper.[2] The formulæ are as follows:—

$$\frac{W^{0\cdot72}}{V.C.} = 0\cdot69. \qquad \frac{\lambda^2 \times Ch.}{V.C.} = 1\cdot85.$$

$$\frac{\lambda^2}{V.C.} = 1\cdot9. \qquad \frac{W^{1/3}}{\lambda^2} = 0\cdot449.$$

$$\frac{Ch.^2}{V.C.} = 1\cdot82. \qquad \frac{W^{1/3}}{Ch.} = 0\cdot457.$$

The above notes indicate the general nature of the Flack and Dreyer tests. A direct simple relationship was hardly to be expected, since, as pointed out above, the former are measures of respiratory competency, the latter of physical proportions.

Preparation of Coefficients and Classification of Cases.

The total number of cases available was in the neighbourhood of 140. As 124 of these were examined by the same instruments and the same examiners, the remaining 16 were excluded from the main analysis, as it was considered desirable to compare cases in which the data obtained had been secured under similar conditions. As a first step it was necessary to calculate all the Dreyer coefficients, as, although the measurements required had been taken, the necessary calculations had not been made. It was also necessary to keep constantly in mind the fact that, while cases had not been actually rejected on Flack tests alone, poor responses were taken into consideration when determining whether an individual should be passed or rejected, whereas, for the cases under review, no such practical use had been made of the Dreyer measurements, as it was considered that these latter were still in an experimental state.

The results so obtained were at first arranged according to whether the candidate had been passed or rejected for aviation, it being considered that this division formed a useful preliminary basis to work upon. Indeed, for anyone who has had the privilege of watching the examination of candidates for aviation and of seeing those rejected on physical grounds and those accepted, there could be no doubt that the methods employed segregated those really fit from the remainder. On close examination, however, of this division it became clear that it was impossible to retain it in its entirety if, as was desired, individual application of results was to be obtained. For among the rejected were a number of cases "ploughed" solely on account of some minor error of refraction, and, from the point of view of respiratory efficiency, obviously wrongly placed among the physically inefficient. Similarly, among those passed for aviation were a number who, at the time of examination were temporarily indisposed, but who, in the judgment of the examiners, were only unfit on account of such indisposition. It then became necessary to scrutinise every individual record, and in order that this might be carried out in a suitable manner it was decided to divide the 124 cases into three groups according to the following definition:—

Group 1.—Comprising all those with clear records or past history complaints limited to childish fevers—e.g., mumps, measles, and chicken-pox—also those rejected for errors of refraction only.

Group 2.—Comprising all those rejected for conditions other than simple refractive errors or definitely noted in records as "temporarily indisposed at time of examination."

Group 3.—Comprising those actually found fit, but about whom some special note appears on their record.

This is obviously a better method of grouping on medical grounds and divides the fit and unfit more accurately.

The experience in the preliminary work when the cases were grouped into passed and rejected had shown that the rejected had not only a poorer set of average

[1] THE LANCET, August 9th, 1919, p. 227.

[2] The coefficients used in this paper have been taken from the original coefficients published by Professor Dreyer. They have not been altered to the coefficients more recently suggested by him, as the correction factors employed effect the same alterations as he has made. Also, the above data were compiled at the beginning of 1920, but were held over until a further check could be obtained upon the accuracy of the results. This has now been secured and will be the subject of a future communication.

Flack figures (as would naturally be expected), but that the average Dreyer coefficient $\frac{W^{0\cdot72}}{V.C.}$ was also a poorer figure than in the case of the passed candidates. Any attempt, however, to apply this apparent correlation to individual cases had only led to disappointment. It was therefore with renewed hope that the average and individual examination of the groups referred to above was taken up.

Table I. shows the average for each of the Flack tests in comparison with the Dreyer tests, $\frac{W^{0\cdot72}}{V.C.}$ and $\frac{\lambda^2}{V.C.}$ (*Note.*—The Dreyer tests, including chest circumference measurements, have not been given, nor has the average factor $\frac{W^{1/3}}{\lambda}$ been given for reasons that will appear later.)

TABLE I.

(A)=Av. breath-holding time in seconds. (B)=Av. fatigue test-time. (C) = Av. expiratory force mm. of Hg.

Group and No. in Group.	(A)	(B)	(C)	$\frac{W^{0\cdot72}*}{V.C.}$	$\frac{\lambda^{2}*}{V.C.}$
1 (74)	71'9	59'2	114'6	0'626	1'745
2 (32)	56'1	42'2	101'7	0'717	2'029
3 (16)	65'3	53'1	104'3	0'659	1'829

* The smaller the resulting coefficients the more physically fit.

It is evident from Table I. that Group 2—i.e., those with impaired physical efficiency—shows an important difference from Group 1 in the average Dreyer and Flack coefficients, indicating that some degree of relationship exists between these two sets of tests. While, as might be expected, Group 3 cases fall generally between the two limits, the table giving a further indication of the rationality of the method of grouping.

Despite the fact that the method of re-grouping had considerably accentuated the difference in the Flack and Dreyer averages, there still remained a disappointing absence of any individual correlation between the Flack tests and the Dreyer tests. For instance, among Group 1, or the fit group, we have two cases whose breath-holding capacity is 85 seconds and 100 seconds respectively, and whose weight vital capacity ratio is more than 10 per cent. worse than the average normal laid down by Dreyer; while in Group 2, or the unfit group, we have two cases whose breath-holding capacity is 65 seconds and 85 seconds respectively, and whose weight vital capacity ratio is normal or better than normal. Similarly we have another case among the fit whose fatigue test time is as much as 55 seconds, while his weight vital capacity ratio is considerably below normal, and in Group 2 we find a case with a similar fatigue test time—viz., 55 seconds—and a weight vital capacity ratio considerably better than normal. Examples of this nature could be multiplied almost indefinitely.

Development of Flack and Dreyer Products.

At this stage it became obviously necessary to review the whole of the data available to determine whether any errors existed or whether any improvement in their general interpretation and use could be made. Considering the Flack tests first it appeared probable that, since either knack, nervousness, or stamina might affect one or other of the tests, if all were combined into a single expression, averaging would take place and differences between those fit and unfit become accentuated. A factor evolved by multiplying each of the three tests together would be a simple way of securing this result, provided that the normal range of movement of each of the measurements was approximately the same.

In the case of the breath-holding and fatigue test this was true, but with the expiratory force test the range of movement was not infrequently of the nature of three to one, whereas in both the others the normal range was as one to one and a half or two. By taking the square root of the expiratory force the range of movement was made comparable to that of the remaining tests. For the resultant a figure of the same dimensions as that used by Dreyer was necessary and this was secured by shifting the decimal point five places. As Dreyer's various data were given symbols it was decided to employ the following letters when referring to the Flack tests:—

E = Expiratory force in mm. of Hg.
T_1 = Time the breath is held in seconds.
T_2 = Fatigue test time in seconds.

The first factor evolved therefore to bring together all the Flack tests in one, and to average, and as far as possible remove, errors or idiosyncrasies was $\frac{\sqrt{E \times T_1 \times T_2}}{10^5}$. The resultant of this coefficient is easily obtained on the 10 in. slide rule. Indeed, throughout the whole of this paper the fact has been steadily kept in mind that for measurements taken from the human subject the slide rule is sufficiently accurate.

On examining the Dreyer ratios for the individuals measured it was first noticed that certain of the unfit cases possessed extremely favourable Dreyer coefficients for the weight vital capacity ratio. Studying each of these cases in detail it was noticed that their favourable position as regards the Dreyer factor was generally due to the weight being largely below the normal ratio he laid down. This observation led to examination of the Dreyer ratio $\frac{W^{0\cdot72}}{V.C.}$, which gave a coefficient diminishing in value with an improved physical efficiency. As the Flack product already used increased with enhanced respiratory efficiency the ratio was first inverted into $\frac{V.C.}{W^{0\cdot72}}$. In this form it was obvious that decrease of weight without change of V.C. gave enhanced values, and that increase of weight produced a handicap. This was felt to be unsatisfactory and some form of correction factor was sought that would result in penalising not small increases or decreases of weight, but wide variations from normal. This was evolved as follows:—

Supposing W_1 to be the theoretical normal weight, W_2 the actual weight, then the difference $(W_1 - W_2)$ might be + or −; so, as it was desirable to eliminate negative signs, the well known fact that the square of a negative quantity is positive suggested that $(W_1 - W_2)^2$ used as a divisor would give something like a satisfactory correction factor. Actually it soon became clear that the effect of a correction factor used in this form would be much too large, so the arbitrary form $\sqrt{1 + \frac{(W_1 - W_2)^2}{10}}$ was chosen, and by trial appears to give promising results. For small differences of weight the correction factor was approximately one, while for wide deviations it became sufficiently large to have considerable effect, vide Fig. 1, which demonstrates this graphically.

The correction factor above described allows some variation of weight in relation to body proportions from the ideal measurement ratios described by Dreyer without placing the individual in an abnormally fit or unfit category; and as it does not in any way penalise increments of vital capacity it may be considered that a real improvement in the measurement of physical proportions has been achieved.

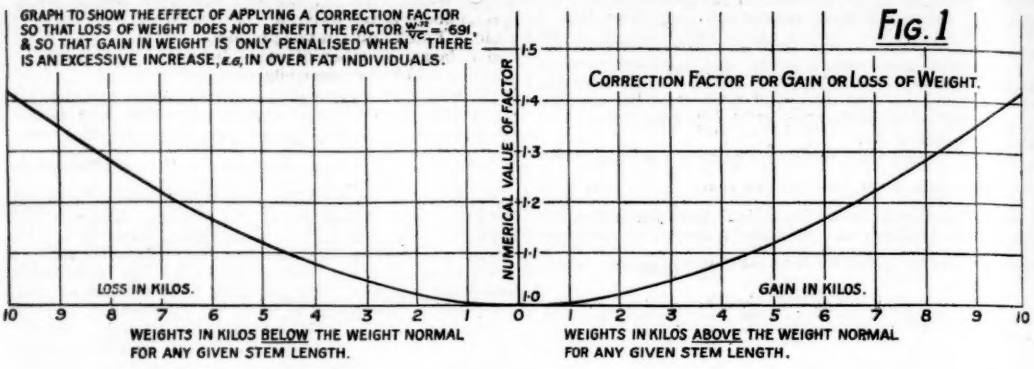
The determination of the theoretical weight presented a difficulty. The only numerical relationships between the physical dimensions available to the writers were those of Professor Dreyer.

$$\frac{W^{0\cdot72}}{V.C.} = 0\cdot69 \qquad \frac{W^{1/3}}{\lambda} = 0\cdot449 \qquad \frac{\lambda^2}{V.C.} = 1\cdot9$$

Where W = Body-weight in grammes. V.C. = Vital capacity in cubic centimetres. λ = Stem length in centimetres.

Mathematically these were inconsistent owing to the substitution (on the recommendation of Professor Dreyer) of $\frac{W^{0\cdot72}}{V.C.}$ for the earlier but more inaccurate value $\frac{W^{2/3}}{V.C.}$.

To make the mathematical relationship between the formulæ consistent $\frac{W^{1/3}}{\lambda} = 0\cdot449$ was modified into the form $\frac{W^{0\cdot36}}{\lambda} = 0\cdot602$, this being the correct mathematical relationship when the power 0·72 is used. The


GRAPH TO SHOW THE EFFECT OF APPLYING A CORRECTION FACTOR SO THAT LOSS OF WEIGHT DOES NOT BENEFIT THE FACTOR $\frac{W^{\cdot72}}{VC} = .691$, & SO THAT GAIN IN WEIGHT IS ONLY PENALISED WHEN THERE IS AN EXCESSIVE INCREASE, *e.g.* IN OVER FAT INDIVIDUALS.
FIG. 1
CORRECTION FACTOR FOR GAIN OR LOSS OF WEIGHT.
NUMERICAL VALUE OF FACTOR
1·0
1·1
1·2
1·3
1·4
1·5
LOSS IN KILOS.
10 9 8 7 6 5 4 3 2 1 0
GAIN IN KILOS.
0 1 2 3 4 5 6 7 8 9 10
WEIGHTS IN KILOS BELOW THE WEIGHT NORMAL FOR ANY GIVEN STEM LENGTH.
WEIGHTS IN KILOS ABOVE THE WEIGHT NORMAL FOR ANY GIVEN STEM LENGTH.

variation from Professor Dreyer's figures is not serious, though certain as yet unpublished results of his suggest that further slight modifications of the formulæ may prove desirable. It appeared preferable to determine the figure taken as the theoretical weight of an individual from a dimension other than the vital capacity, and stem length was selected.

From this formula $\left(\frac{W^{0\cdot36}}{\lambda}\right)$ a table of weight against height was prepared (see Table II.), and was used for the determination of the theoretical weight in the individual throughout these calculations. It is frankly admitted that this table may not be absolutely accurate, but the error is small and in no way affects the validity of the method of comparison put forward in this paper.

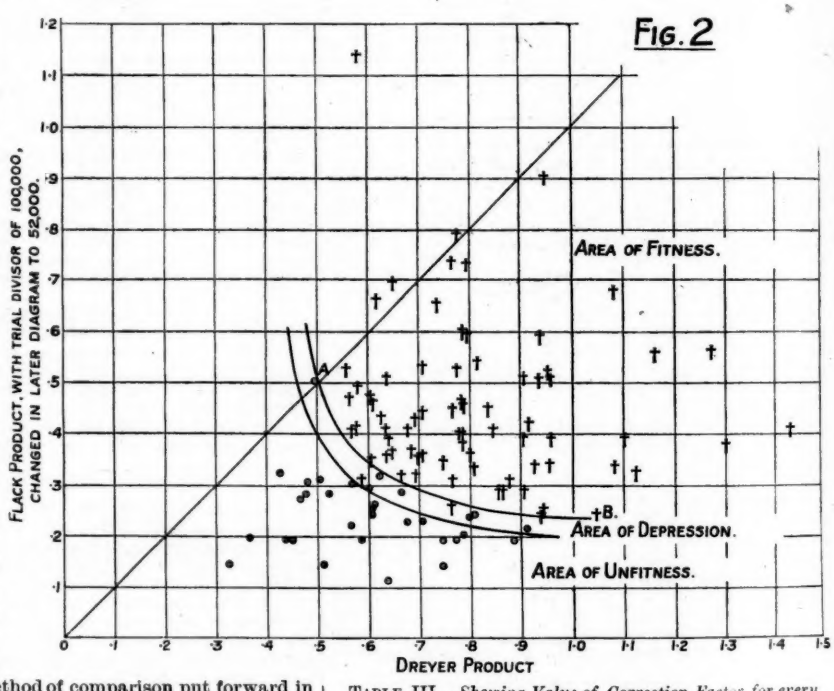


FIG. 2
FLACK PRODUCT, WITH TRIAL DIVISOR OF 100,000, CHANGED IN LATER DIAGRAM TO 52,000.
AREA OF FITNESS.
B.
AREA OF DEPRESSION.
AREA OF UNFITNESS.
·1 ·2 ·3 ·4 ·5 ·6 ·7 ·8 ·9 1·0 1·1 1·2 1·3 1·4 1·5
DREYER PRODUCT

TABLE II.

$^*\lambda = \frac{W^{0\cdot36}}{0\cdot602}$ $\qquad \lambda = W^{0\cdot36} \times 1\cdot6612$

W.	λ*	W.	λ*	W.	λ*	W.	λ*
50,000	81·68	58,000	86·16	65,500	90·06	73,000	93·63
50,500	82·02	58,500	86·42	66,000	90·28	73,500	93·89
51,000	82·29	59,000	86·68	66,500	90·56	74,000	94·12
51,500	82·57	59,500	86·96	67,000	90·79	74,500	94·34
52,000	82·86	60,000	87·22	67,500	91·06	75,000	94·61
52,500	83·18	60,500	87·51	68,000	91·28	75,500	94·79
53,000	83·44	61,000	87·72	68,500	91·51	76,000	95·02
53,500	83·68	61,500	87·98	69,000	91·75	76,500	95·15
54,000	84·02	62,000	88·25	69,500	91·98	77,000	95·48
54,500	84·28	62,500	88·46	70,000	92·23	77,500	95·68
55,000	84·56	63,000	88·81	70,500	92·46	78,000	95·88
55,500	84·86	63,500	88·97	71,000	92·69	78,500	96·12
56,000	85·18	64,000	89·28	71,500	92·96	79,000	96·35
56,500	85·34	64,500	89·50	72,000	93·19	79,500	96·60
57,000	85·62	65,000	89·76	72,500	93·41	80,000	96·78
57,500	85·91						

In order that the stem length might be expressed also in what may be called the Dreyer product now being built up the second Dreyer ratio $\frac{\lambda^2}{V.C.}$ was inverted and included, the whole Dreyer product now becoming $= \frac{V.C.^2}{\sqrt{1 + \frac{(W_1 - W_2)^2}{10}} \lambda^2 W^{0\cdot72}}$

TABLE III.—*Showing Value of Correction Factor for every Half-kilo from 0 to 15.*

(A) $W_1 - W_2$ kilos.	(B) Correction factor.						
(A)	(B)	(A)	(B)	(A)	(B)	(A)	(B)
0	1·00	4·0	1·08	8·0	1·28	12·0	1·56
0·5	1·00	4·5	1·1	8·5	1·31	12·5	1·60
1·0	1·005	5·0	1·12	9·0	1·34	13·0	1·64
1·5	1·01	5·5	1·14	9·5	1·38	13·5	1·68
2·0	1·02	6·0	1·17	10·0	1·41	14·0	1·72
2·5	1·03	6·5	1·19	10·5	1·45	14·5	1·76
3·0	1·045	7·0	1·22	11·0	1·49	15·0	1·80
3·5	1·06	7·5	1·25	11·5	1·52		

Combination of Flack and Dreyer Products.

Attempts to combine the Dreyer and Flack products by addition gave hopeless results, some of the fit individuals falling far below those who had failed lamentably. A graphical method was now tried, the Flack product: $\frac{\sqrt{E \times T_1 \times T_2}}{100{,}000}$ being plotted against

the Dreyer product: $\frac{V.C.^3}{\sqrt{(1+(W_1-W_2)^2)}\ W^{0.72}\ \lambda^2}$. The result was a shotgun pattern of points (see Fig. 2), but it was at once evident that those who had failed (shown as circles) could be separated from those who were passed (shown as daggers) by a definite line, and further, that this line was for practical purposes a rectangular hyperbola.

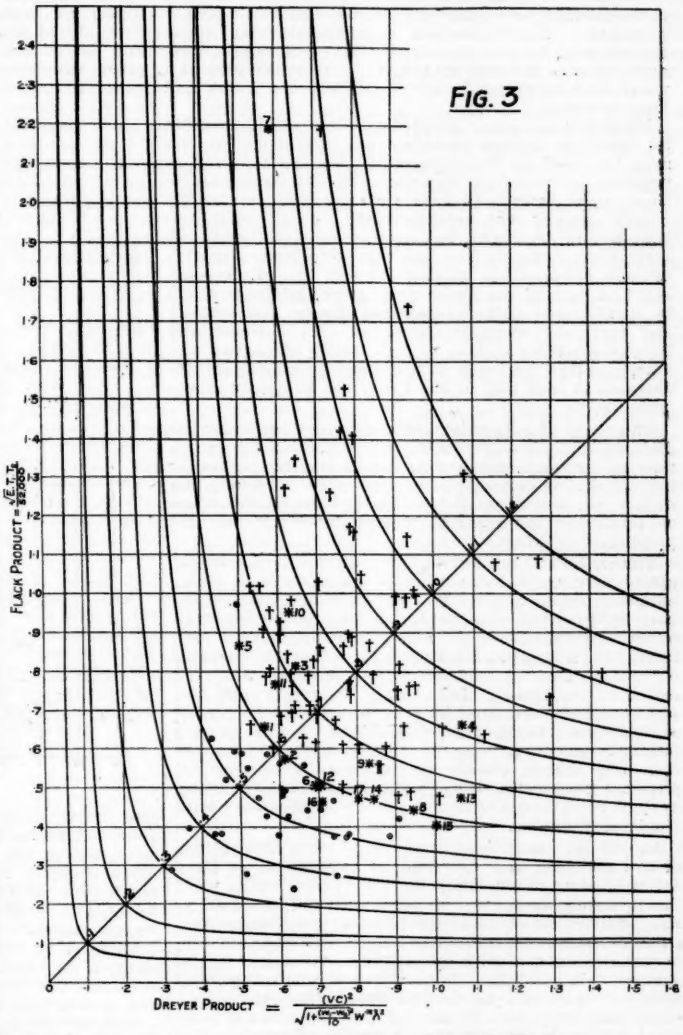
A little thought showed the reasonableness of this. Consider the two points A and B in Fig. 2. Where A has a high Flack and a low Dreyer, B a high Dreyer and a low Flack, clearly there is no reason why a man should not have a high Flack because he has a low Dreyer, or vice versa. The one is a measure of forces, the other chiefly of dimensions. If the forces (Flack) and dimensions (Dreyer) were in any way proportional, then the pattern of points would have tended to lie on a line passing through the origin, but there is no suggestion of this in the graph Fig. 2. Rather do the points show that two individuals of the same physical proportions may have widely different respiratory competency, a matter of common experience.

Again, consider A and B in Fig. 2 and look at the dividing line between fit and unfit. It is simply a visible expression of the dividing line selected by the medical experience of the examiners. It is a line of equal physical fitness determined unconsciously by the examining doctors. Poor physical proportions and good respiratory condition are approximately equal to good physical proportions and poor respiratory tone, and the line selected by medical opinion as a line of equal respiratory efficiency on the products used happens to approximate to a rectangular hyperbola; a conic section which allows gain in one direction to be balanced by loss in another.

It must not be forgotten in considering these results that in evolving the Dreyer and Flack products the writers had no thought of using them in diagram form; the initial intention was to use the products by addition or multiplication, and the diagram was adopted as a last resort before dropping the whole investigation, owing to the failure of the earlier methods.

As first developed the hyperbola was not entirely satisfactory; it provided regions of respiratory fitness, of depression, and of unfitness, but no means of comparing individuals except in a very rough manner. Also the line was not symmetrical in respect of the two base lines, as it was nearer the horizontal base than the vertical. This merely meant that the factor evolved from $\frac{\sqrt{E \times T_1 \times T_2}}{100{,}000}$ was too small, and that if symmetry was to be secured a smaller figure than 100,000 would be required as the denominator. The average values of the two products obtained by the Flack and Dreyer measurements gave a position on the chart considerably below the line halving the right angle between the two scales. As symmetry could only be obtained when the average fell on a line at 45° to the base line it only remained to multiply the average Flack product by a figure that would make the resultant fall on the 45° line while retaining the same Dreyer product. This figure when incorporated in the Flack product gave a denominator of 52,000. Put shortly, the whole of the points were pulled upwards until they were evenly spread about a line halving the right angle between the scale of Flack and Dreyer products. It is possible that had a larger number of cases been taken the number 52,000 would have been slightly different, but its error is certainly not more than 2 or 3 per cent.

With the points in this new position the dividing line



Key to the Numbered Cases in Fig. 3.

Case.	Remarks from Medical Record Sheet.
1	Some nervous instability with tremor of eyelids, tongue, and fingers.
2	? signs of air fatigue or developing alcohol habit.
3	Definite history of asthma. Has coryza.
4	Many childish ailments, including scarlet fever and diphtheria.
5	Nervous. "Not well for last three days."
6	Tremor; has had operation for umbilical hernia; some nervous instability.
7	History of rheumatic fever and diphtheria.
8	History of diphtheria.
9	"Nasal obstruction." No operation ordered.
10	"Nasal obstruction." No operation ordered. Chilblains frequent.
11	Chronic mouth breather. No operation ordered.
12	Nervous instability and tremor, and poor coördination for balance.
13	Not well owing to sea-sickness the previous night.
14	Extrasystoles; poor abdominal tone; exaggerated reflexes.
15	"Defective circulation," but "passed on appeal."
16	"Border-line case." "Under-developed."

was redrawn and the mathematical form of the rectangular hyperbola to which it approximated determined.

It is sufficient to state here that a mathematically exact hyperbola occupying a position as nearly as possible coincident with the empirical curve separating the fit from the unfit group required its base lines or asymptotes to lie along the horizontal and vertical lines corresponding to 0·3 and 0·3 on the Flack and Dreyer products. The hyperbola constructed from these asymptotes, to coincide with the empirical curve, actually cuts the line running at 45° from the base at a point that corresponds to 0·6 on both the Flack and Dreyer scales.

Retaining the same asymptotes, it would be possible to draw an infinite number of hyperbolæ in the area enclosed by the asymptotes, but it would not be possible to construct hyperbolæ in the area outside these asymptotes. As certain of the cases fell in this outside area it was arranged that a family of hyperbolæ should be drawn having the same relationship to their asymptotes as the one just described. By this scheme a hyperbola cutting through the 45° diagonal at 0·5 on each of the Flack and Dreyer products would be constructed from asymptotes drawn horizontally and vertically along the 0·25 line of the Flack and Dreyer products and so on. A family of curves was drawn on this principle, so that each hyperbola cut the diagonal at each unit of the Flack and Dreyer products (vide Fig. 3).

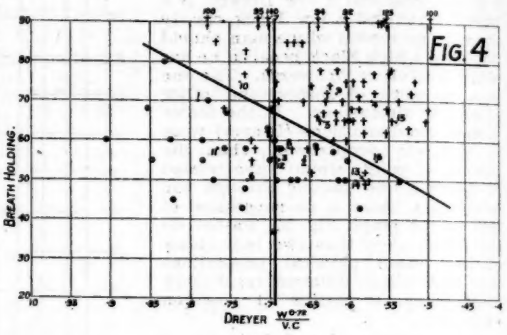
The scale of respiratory efficiency now becomes the distance along the 45° line to the particular hyperbola passing through the point, marking any particular individual. It is simply a number scale on which the higher the individual the better his respiratory organs as measured for respiratory tone by Flack and for proportion by Dreyer.

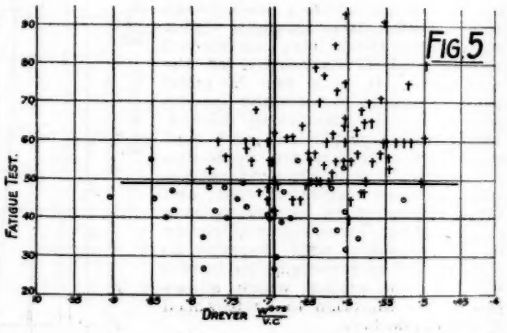
The writers do not put it forward that a man whose efficiency figure is 1·0 is twice as good as a man whose efficiency figure is 0·5. He may be twice as good, he may be three times as good, and he may be only half again as good. They do assert, however, that a man having the numeral 1·0 is fitter than a man only scoring 0·9 or 0·8. The value claimed for this curve is that it enables a series of individuals of widely different physique to be arranged in order of respiratory fitness, such fitness having been determined from tests of a totally independent nature. In no sense is it proposed that the curves should be taken as a measure of physical fitness as a whole; that is a matter of many systems. These curves are only concerned with respiratory fitness.

As will have been seen from the previous descriptions of the meaning and functions of hyperbolæ, we have areas of similar efficiency for the system under test; the meaning, therefore, of the graph as presented is that individuals of moderate physical proportions may equal or even excel individuals of perfect physical proportions, if their working systems are more highly efficient. It is felt that the whole graph in recognising this principle, and in demonstrating the equality of respiratory efficiency for fairly wide ranges in the tests employed, is merely setting out graphically the experience of everyday life when dealing with human material. In hopes of obtaining a simpler method of comparison the Flack figures for breath-holding were plotted against the Dreyer value $\frac{W^{0\cdot72}}{V.C.}$ and also the Flack fatigue test against the same function—viz., $\frac{W^{0\cdot72}}{V.C.}$. The results are shown in Figs. 4 and 5, and in both cases are poor compared with the results obtained from the more complex formula.

Fig. 3 is a graph of the whole of the 124 cases. Group 2, or the unfit cases, are represented by circles, and it will be seen that these are, with a single exception, all disposed to the left of the empirical hyperbola marked on the graph as 0·6. The exception is in itself interesting, as the records show a history of empyema but no indication that complete recovery has not taken place. As, however, an empyema necessarily involves extensive damage to the contents of the thorax this case was included in Group 2.

On one or other side of the hyperbola 0·6 are found nearly all the Group 3 cases, and since these form, as it were, a bridge between Group 1 and Group 2 cases, they have been numbered and extracts from their medical histories given as footnotes. On examining these extracts it will be seen that either a temporary condition of malaise was present, and the medical foresight of the examiners had rightly seen beyond it and passed the candidate, or the individual had been given the benefit of the doubt which had evidently presented itself to them. In this group also are





one or two civil pilots who came within the category provided for by the convention—viz., "No aeronaut who, before the date of the present convention, has given proof of his flying ability, shall, so long as he retains his ability, be necessarily disqualified because he fails to fulfil all of the above medical and surgical requirements." Their position on the graph when considered in relation to the fit and the unfit and in relation to their medical condition is satisfactory evidence that the method employed to correlate the two sets of tests is sound.

Despite the apparent complexity of the Flack and Dreyer tests as here used—as has been said—they are all capable of rapid and simple elucidation on the slide rule. With a standard graph ready it should not take more than two or three minutes to determine and enter the exact position of any individual under examination.

Conclusion.

In concluding this paper the writers wish to point out that its results are at present only applicable to male adults ranging between the ages of 18 and 28, and with the weights of 47–85 kilogrammes. It is, however, not unreasonable to suppose that the principle here developed for combining measurements of physical proportion and of respiratory condition or tone is capable of extension to other ages, to the female sex, and to the other systems of man. It is probable that the divisional coefficient 52,000 of the Flack tests will need modification for different ages and sexes. It may be possible to express it as a function of age and sex.

either by raising the age to a power or by expressing it as an exponential and multiplying the result by one constant for men and another for women. It is, however, likely in view of the method of carrying out the Flack tests that for general use modifications of the tests themselves will be required. The results given here appear to afford satisfactory evidence of the value of both the Flack and Dreyer tests, and show that the absence of an obvious agreement does not mean that there is no agreement, but (given good data) calls for further search for such agreement.

During the investigation a factor was devised for the pulse, but subsequently put aside when it became obvious that human efficiency in its entirety could only be represented by an indeterminate formula; in fact, any application of mathematics to medicine must be very cautiously carried out. Modern science being based on measurements, the use of mathematics as a mode of extending the comparability of given measurements is of the utmost value. But in medical science, as in engineering, only a limited number of the causes of any result can be measured. In consequence, although the measurements themselves may be exact, the mathematical results obtained are only approximate and may be entirely erroneous.

It is not to be expected that in so complex a mechanism as the human body simple and direct mathematical correlation of divers measurements can be obtained. The graphical method of correlation that the writers put forward for the Flack and Dreyer tests is almost incapable of formulative expression; it forms a modification of methods well known in thermodynamics and other branches of engineering. The writers believe that the application of these methods to anthropometry is new; they believe them capable of great extension, and that there is even some hope of obtaining by them useful efficiency factors for all the principal systems of the human body.

It is desired to thank the D.M.S. of the R.A.F. Medical Service for the loan of the records of the Special Medical Board, from which the majority of the data used in this paper have been elaborated, and to thank Wing Commanders A. P. Bowdler and Martin Flack for their assistance and help at every stage of the investigation. The authors are also indebted to Professor Dreyer and Dr. Hobson for the loan of apparatus and for advice as to the interpretation of the Dreyer coefficients.

THE INDUCTION OF PREMATURE LABOUR:

ITS SCOPE AND PRESENT RESULTS.

BY SIR JOHN PHILLIPS, M.A., M.D. CANTAB., F.R.C.P.,

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IN THE LANCET of August 16th, 1919, I published a paper on the question as to whether mortality in childbirth could be any further reduced, giving a brief summary of 2100 cases of labour I had attended in private practice, with 7 deaths, a mortality of 3 per 1000. The present contribution is an amplification of part of this paper, so far as the artificial interruption of pregnancy is concerned.

The History of Induction of Labour.

The induction of labour for the preservation of maternal and fœtal life may definitely be stated to be entirely English in origin, as it was first performed in 1756 by Macaulay, with Denman's approval, the operation being only first performed in Germany as late as 1804, and in France not till 1831, the objection to the operation being probably of a religious nature. The method by which induction was performed is not definitely stated, but it was probably by rupture of the membranes by a sound or stilette, a certain but obviously unsatisfactory means of producing the desired effect. The great difficulty with which uterine pains were evoked was the chief drawback encountered by the earlier operators. Efforts were therefore subsequently directed towards devising more certain means of accelerating the appearance of labour pains. Scattered through literature one meets with the insertion of sponge tents by Kluge, the injection of carbonic acid gas into the vagina by Simpson and Scanzoni, and the use of hot vaginal douches by Kiwisch (1836), but all these were unsatisfactory and were attended by risk. Later, attempts were made upon the uterine cavity itself—namely, by separation of the membranes in the lower uterine segment—by Hamilton, of Edinburgh, and the injection of creosote water (Cohen) and glycerine (Peltzer) between the membranes and the uterine wall, but these led to such disastrous results, probably from embolism, that they fell into disuse.

On the assumption of uterine bi-polarity, measures were directed towards dilating the cervix in the hope of provoking contraction of the fundus, and hence we encounter the various kinds of tents, sponge, tupelo, and laminaria, with various shaped dilatable india-rubber bags (Keiller and Barnes), the latter being made fiddle-shaped, to secure their more sure retention in the cervical canal. Finally, de Ribes (1888) invented his variety of dilating bag, which remains in use up to the present day.

With regard to drugs, I believe it is now generally acknowledged that no known drug will initiate uterine labour pains, but that once started ergot, and more recently pituitrin, the latter especially, have the power of ensuring their continuance, and, indeed, of adding to their potency.

In the "seventies" it was almost habitual to use either a tent of compressed sponge pushed into the cervix, or a long catheter, with a stilette to give it rigidity inserted into the uterine cavity between the membranes and the uterine wall. The catheter was usually new and taken out of a whitey-brown linen bag, lubricated with carbolic oil, and used without further cleansing; needless to say that much sepsis and mortality followed both these methods. With the introduction of antiseptics, however, a great improvement occurred in results, except that the uncertainty of the onset of labour pains still hampered the operator. The catheter was supplanted by a hollow bougie containing a stilette, followed by two or even three others if necessary. The value of the stilette consisted in the fact that it enabled the operator, by bending the distal end, to pass it easily by any obstruction, such as fœtal limbs lying in the uterine cavity, without rupturing the membranes. Often, however, many days elapsed before labour pains appeared, if indeed they appeared at all, and it was not until a combination of dilatation by laminaria tents or Hegar's bougies, with a de Ribes's bag, that labour could be produced with any certainty within a definite time. To these methods must be added the important one of digital dilatation, the obstetric finger obtaining better and more certain results than any of the above methods.

With regard to tents, there is no doubt that a sponge tent, however carefully prepared, is a most dangerous means of inducing labour; with the laminaria tent it is quite different. This instrument, if kept in 1 in 1000 alcoholic solution of mercury, remains aseptic over a prolonged period, and I have never known any accident or complication arising from its use; it not only dilates but softens the cervix. I have used these for many years, and my custom has been to insert in the afternoon into the cervix from one to three of the long variety, fresh from the solution, and within 18 hours to remove them; the cervix will then be found to admit a finger and also to be quite soft and dilatable, enabling one to insert, after a little digital dilatation under an anæsthetic, a small de Ribes's bag. I believe the laminaria tent is regarded by some as unsafe, these operators doubtless preferring to resort to rapid dilatation by means of Hegar's bougies, thus by failing to secure softening of the cervix, possibly producing laceration. Soon after the use of de Ribes's bag became general in England I had a specially small size made to insert immediately after removal of the tent from the cervix, attaching to it a small weight of about one pound by a tape running over the back of a convenient chair; by this means constant tension on the bag is produced. I cannot recall any single case in which this method was employed in which labour was not started within a few hours, and for some years I have been accustomed

either to carry out this procedure or to pass in one to three sterilised bougies and at the end of 24 hours to insert the bag. I believe the weight to be a very important element in the success of the proceeding.

Tables of Indications and Results.

I have collated all the cases occurring in my private practice in which I have performed the operation of induction, and have watched the case during the whole of the month. I have also included the cases I have seen in consultation, and have carried out the actual induction. They amount to 161, and I append below in a tabulated form the reasons for, and the results of, the induction.

Indications.	Results. (R., recovered, D., died.) Mother. R.	Mother. D.	Child. R.	Child. D.
Pelvic deformity—				
70 contracted pelvis	70	—	64*	7
1 „ with acute *B. coli* infection	1	—	2*	—
1 „ with acute yellow atrophy of liver [2]	—	1	—	1
1 „ with albuminuria and glycosuria [1]	1	—	1	—
2 „ with scar tissue	2	—	2	—
1 „ with infection of the hepatic ducts from *B. coli*	1	—	1	—
Other than pelvic deformity—				
(*a*) Visceral disease.				
15 acute albuminuria	13	2	12	3
12 cardiac disease	12	—	12	—
1 pneumothorax	1	—	1	—
2 pus in pleura	2	—	2	—
1 pyonephrosis	1	—	1	—
1 „ with placenta prævia	1	—	1	—
1 tubercular disease of kidney	1	—	1	—
3 enlarged thyroid	3	—	3	—
1 secondary hepatic cancer	1	—	1	—
1 acute bronchitis and influenza with excessive liquor amnii [3]	—	1	—	1
(*b*) Pelvic viscera.				
12 fibroid complicating pregnancy	11	1	11	2*
1 severe contractions of pregnancy	1	—	1	—
2 scar tissue in pelvis from pelvic abscess	2	—	2	—
1 ventrofixation with distortion of uterus [4]	—	1	1	—
3 hydramnion	3	—	1	2†
12 placenta prævia	11	1	8	4
(*c*) Fœtal.				
6 exceptionally large child	6	—	6	—
5 repeated death of fœtus	5	—	4	1
1 impending death of fœtus	1	—	—	1
(*d*) Miscellaneous.				
1 malaria	1	—	1	—
2 acute *B. coli* infection	2	—	—	2
1 osteosarcoma of the left thigh	1	—	1	—

* These figures include twins. † Deformed.

[1] Induction started, but Cæsarean section performed owing to onset of eclampsia (vide THE LANCET, Oct. 16th, 1915).

[2] THE LANCET, August 16th, 1919; and Obstetrical and Gynæcological Journal, June 8th, 1916.

[3] THE LANCET, August 16th, 1919.

[4] THE LANCET, August 16th, 1919.

Thus, in 161 cases of induction of labour there were 7 maternal deaths (4·3 per cent.) and 24 fœtal deaths in 164 children (14 per cent.). The cases of maternal death speak for themselves, and were acute bronchitis (1), multiple fibroid with twins (1), contracted pelvic and acute yellow atrophy (1), ventrofixation and bilobing of uterus (1), placenta prævia (1), acute albuminuria and eclampsia (2); total, seven. Want of space alone prevents a full description of each of these fatal cases.

With regard to the fœtal deaths, they were as follows: As the result of labour with contracted pelvis, 8 died from immaturity, congenital malformation, meningeal hæmorrhage and atelectasis; from prematurity and delay in labour (3), from delivery with placenta prævia, breech presenting (4, in one of these the cord was prolapsed), deformed and complicated by hydramnion (2), from acute *B. coli* infection (2), from labours complicated by eclampsia (3), from induction for impending death of fœtus (2).

With regard to the maternal deaths, I think none of them can be attributed to the actual induction, as a fatal result would, in all probability, have occurred without the operation; induction of labour may, therefore, be looked upon as a procedure which, per se, should be unattended by any mortality.

Nine Unusual Cases.

I do not propose to give in detail the circumstances connected with each of the 161 cases, although many of them presented a very unique course, but I have ventured to append below particulars of nine cases which appear to me to present unusual features and which may be of service to others meeting similar cases.

CASE 1. *Pneumothorax and severe dyspnœa, induction of labour at about the thirty-sixth week of pregnancy, a living child.*—The patient, aged 28, underwent dilatation of the cervix for dysmenorrhœa and sterility some years before, without producing any effect. Four years before the labour she had had pleural effusion and complete collapse of the left lung. Subsequent to that accident she was always more or less in a state of dyspnœa unless entirely at rest. She then became pregnant, and as pregnancy advanced the dyspnœa became much more severe, and finally it was found necessary to induce her labour, which was performed by means of two bougies. Labour came on within 24 hours and terminated at the end of another 24 hours in the birth of a 5½ lb. child. The patient was unable to bear down, and delivery was by forceps immediately on two-thirds dilatation of the cervix, placenta and membranes being removed by hand. She made a very easy recovery, but the collapsed lung remained and still remains unaltered at the present time. Certain physical changes in the aspect of her thorax, which were well marked at the time of labour, remained unaltered. This patient has again recently gone through a severe attack of influenza and broncho-pneumonia and recovered after a desperate illness.

CASES 2 AND 3. *Acute* B. coli *infection.*—(2) The patient, aged 21, a primigravida, was in her thirty-seventh week of pregnancy and the urine had recently been examined and found to be quite normal. She then suddenly developed an acute urticaria, chiefly on the chest and arms, with a slight elevation of temperature (100·2° F.) at night. It was thought that it was toxæmic in origin from her digestion, which was not good, but no remedies seemed to have any effect upon the rash. During the whole 24 hours she was in a state of constant irritation from the rash, which appeared in the form of large wheals and which gradually spread practically all over her body. The urine, however, remained normal. The temperature was always a little elevated at night. At the end of a week she was so worn out and ill from the effects of the rash that induction of labour was decided upon. The introduction of three bougies resulted in 12 hours in good pains, and labour was terminated in the birth of twins, both being born with the occiput posterior and unreduced, and delivery by forceps was carried out. Within a few hours of the termination of labour her temperature rose, but there was no feeling of illness, the involution was rapid, and the discharge normal. On the fourth day her temperature rose to 104°, other physical signs being negative. A catheter specimen of her urine was again examined and was found to produce a pure culture of bacterium coli. Vaccine treatment was at once carried out, the rash gradually subsided, and the temperature almost immediately went down. Subsequent progress was quite uneventful. At two subsequent labours a somewhat similar experience was noticed, but she was placed upon vaccines before the labour and no rash appeared, but the bacterium coli was present to a large amount. In the unimpregnated state she appears to be quite free from infection.

(3) The patient, a primigravida, was in her thirty-eighth week of pregnancy and in perfect health. A bacteriological examination of her urine had been made 48 hours before and had been found negative. Fœtal movements were strong and heart sounds easily heard in the left flank at my visit at that time. I was sent for 48 hours afterwards and the patient complained of the movements being very slight. I could find nothing amiss beyond the fact that the fœtal pulse was irregular and feeble, and looking on the case as one of approaching fœtal death I thought it advisable to induce labour. As the cervix was very long I used laminaria tents, and at the end of 24 hours introduced a small de Ribes's bag. Labour was completed about 40 hours from the time of the introduction of the tents. During the labour the waters ruptured and a most putrid-smelling purulent liquor amnii escaped, an examination of which proved it to be a pure culture of bacterium coli. Immediately the cervix was two-thirds dilated I applied the forceps and delivered quite easily. The child was stillborn and the skin was just beginning to peel in the groins and stomach. The uterus was thoroughly washed out with a hot iodine solution, which was repeated at intervals during the first three days of the puerperium. The patient did quite well and had not any rise of temperature. Subsequent examination of the urine a month after labour gave a negative result. No further pregnancy occurred.

Both these cases show the insidious and rapid onset of infection from bacterium coli. In both the urine had fortunately been examined bacteriologically, with a negative result, so that the infection of the generative tract by the germ must have been very rapid and once there had proliferated at a great rate, in the first case producing acute coli poisoning and in the second fœtal death, without influencing the general maternal organism.

CASE 4. *Enlarged thyroid, which increased during pregnancy, with severe dyspnœa.*—The patient, a II.-para, aged 43, had suffered for some time with slight general enlargement of her thyroid, which gave a characteristic husky tone to her voice and gave her much distress of breathing whenever she got a cold. About three months after her second pregnancy began she noticed that the breathing, especially at night, was more laboured, and she had to sit up in bed to get any sleep. This condition gradually increased in severity, and at the end of the thirty-fourth week her face had become dusky with venous congestion; her breathing at night was so high-pitched and laryngeal that it could be heard over the whole of the house, and her distress in breathing was steadily increasing. Many remedies were tried, but, failing to relieve her, I decided on induction of labour at the thirty-sixth week. This was carried out quite easily under an anæsthetic by the introduction of two bougies and digital dilatation of the cervix. Labour began and terminated within 14 hours; immediate relief followed

the delivery of the child. Her condition during the labour having become very serious, owing to the increased venous congestion from the bearing down pains, forceps was applied as soon as the cervix was two-thirds dilated. She subsequently made a good recovery, and although the thyroid has become almost normal again she still has the curious husky intonation.

CASES 5 AND 6. *Empyema.*—In both of these a considerable accumulation of pus in the pleura during the pregnancy necessitated aspiration, followed, however, by reaccumulation of the fluid. So much embarrassment of breathing took place in both cases that induction of labour was carried out, in one at the thirty-fifth week, and in the other at the thirty-fourth. Much relief followed the delivery, but treatment of the empyema was necessary in the form of free incision and the introduction of a tube in one case, and excision of a portion of a rib in the other. In both cases the disease was in the left pleura. Both patients ultimately made good recoveries.

CASE 7. *Secondary hepatic cancer.*—This case has already been fully reported (vide Obstetrical Transactions of London, vol. xxix., 1887, p. 378). The patient, aged 40, was first seen when six months' pregnant; she had been operated on six months before, when she had missed one period, for malignant disease of the right breast. When I first saw her she was suffering from acute pain in the hypochondrium, which seemed to defy all remedies. Her condition gradually became worse and the pain more severe, and when about 34 to 36 weeks' pregnant I induced labour by the introduction of bougies. Easy labour followed and the child was born alive. On the uterus being emptied large bosses present on the enlarged liver made the diagnosis certain. Jaundice and ascites appeared and she died comatose three days after her confinement.

In the discussion which followed the reading of this paper the relative value of induction and Cæsarean section was discussed. In 1887, when this case occurred, there is no doubt that statistics showed that induction of labour was the safer and better operation, but I must confess that had this case occurred in my practice within the last ten years I should have certainly carried out Cæsarean section.

CASE 8. *Severe contractions of pregnancy.*—A young primigravida, when about 16 weeks pregnant, was somewhat alarmed by seeing a lift accident. In the evening of the morning of the fright she began to have regular uterine pains, but no coloured discharge; the pains occurred at intervals of from 10 to 12 minutes. The uterus hardened and projected through the thin abdominal walls, and the expression of the patient's face showed that she was suffering acutely. There was no temperature and no albuminuria or any visceral disease, but a slight increase of pulse during the height of the pain. The pains went on for several days without any show or alteration in the cervical canal, and it was finally concluded that the case was one of painful uterine contractions of pregnancy. The clinical course of the case was sufficiently simple, but the pains resisted all drugs and continued at more or less regular intervals until the termination of the pregnancy. Electricity and absolute rest proved of no avail. About the thirty-fourth week she was physically failing from the constant pain and sleepless nights; there was also marked emaciation. She was encouraged to continue her pregnancy until the thirty-sixth week, when labour was terminated by induction. It was quite a simple confinement, the patient affirming that the pains of labour were less severe than those of pregnancy. She suffered from no after-pain; mother and child did well. In a subsequent pregnancy the painful contractions did not recur.

My own feeling about this case is that the fright may have been a mere coincidence and not a direct cause of the pain, as she was of a highly nervous temperament, although she bore her sufferings with great pluck and determination.

CASE 9. *Osteo-sarcoma of the left thigh.*—The patient, aged 35 and a III.-para, was in her thirty-sixth week of pregnancy. For some time she had complained of severe pain in her left thigh, and a surgeon who saw her considered that she had some severe affection, probably of a malignant nature, connected with the femur, which would probably mean amputation of the limb immediately or preliminary induction of labour. The mother was most decided in her opinion that the child's life must be secured, if possible. After careful consideration it was decided to induce labour as rapidly as possible, and when the patient was sufficiently recovered to proceed to operation. Induction of labour was carried out in the thirty-seventh week by digital dilatation of the cervix and the insertion of a de Ribes's bag; the whole operation from the commencement of the induction to the termination of labour by easy forceps delivery occupied six hours. Except for the constant pain in her left thigh the puerperium was perfectly normal; at the end of that period amputation at the hip-joint was performed, from which she made an excellent recovery, and was well five years later. She was subsequently lost sight of.

Remarks.

A glance at the foregoing table will give an idea of the large increase in scope in regard to the class of case in which induction has been recommended and carried out during the last half century. There are, however, others which must be carefully considered as to the question of the propriety of interrupting the pregnancy. I allude to cases of pulmonary tuberculosis, malignant disease of the breast, diabetes, and certain chronic diseases of the appendix, especially that termed a "grumbling" appendix. All these cases have on more than one occasion come under my care, and hitherto I have not considered that any advantage would accrue to the patient by the interruption of pregnancy, so that induction of labour for any of these conditions does not appear in my table. I believe a few instances of the above might be considered suitable for induction, but each one would have to be considered on its merits. The cases I have had of pregnancy complicated by a grumbling appendix, have all waited until the labour was over, when they were dealt with by the surgeon in the ordinary way. Two cases of fulminating appendicitis were operated on during pregnancy, with happy results to both mother and child.

The scope of the operation is, however, slightly limited in another direction—namely, that Cæsarean section has to a greater or less degree taken its place in such cases as albuminuric convulsions in a primigravida, complete placenta prævia, and in cases of contracted pelvis in which the pregnancy has not reached 32 weeks. I have, however, in this latter condition induced several cases under 32 weeks pregnant, in which a very comfortable labour has occurred, and the child was reared without any drawbacks.

With regard to the methods of induction, if time is not an object, there is no doubt that the insertion of one to three bougies, well up to the fundus, is a fairly safe and certain method, but it has the unfortunate drawback of having no time limit. The bougie softens the cervix and it can be inserted without an anæsthetic, both distinct advantages. In my experience it is more efficacious in first cases than in multiparæ; in multiparæ I have been accustomed to use it very rarely, finding that digital dilatation, followed by a de Ribes's bag, frequently results in the onset of labour pains, and, indeed, the completion of labour in from 12 to 24 hours. Should the cervix be long and unsoftened, as in many primigravidæ, the preliminary use of laminaria tents is certainly to be recommended, and it is my experience that resort to either of the two methods can practically be guaranteed to provoke labour pains and even to result in the termination of labour within 24 hours.

Concerning the appearance of labour pains after any specified mode of induction, I might say that in five cases, after manual dilatation alone under an anæsthetic, labour has been completed quite easily in under 20 minutes, examination at the end of the puerperal month exhibiting no signs of laceration of the cervix. Such an instrument as Bozzi's dilator acts on wrong principles, and in my opinion should never be used.

In conclusion, therefore, I would say that in cases where rapid delivery in a primigravida was necessary, such as in puerperal convulsions and complete placenta prævia, it would, perhaps, be preferable to perform Cæsarean section, but should the case be that of a multipara digital dilatation and a de Ribes's bag would be the best course to pursue. If there is no urgency and the case can be taken deliberately, I think bougies, followed by digital dilatation or a de Ribes's bag, is the preferable course.

THE DURATION OF VENTRICULAR SYSTOLE.

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THE duration of ventricular systole, as judged by the duration of the Q-R-S-T complex of the electrocardiogram, is remarkably constant in health. In a series of 24 normal persons it averages 0·329 second, the extreme figures being 0·28 and 0·36 second. A similar constancy of the period of ventricular systole obtains in the vast majority of patients in whom electrocardiograms have been recorded on account of some cardiac, or other, disability. In some patients, however, the duration of ventricular systole is prolonged, and continues for 0·40, 0·50, 0·60 second, and in one instance even for 0·68 second. This abnormality does not seem to have attracted attention, and as it may prove to be a sign of value in the recognition of myocardial changes we shall state the facts observed.

Prolongation of ventricular systole occurs in many diverse conditions. It has been found in patients whose hearts were apparently sound, as well as in those with valvular or myocardial disease; in patients with a regular, and with a disordered, rhythm; and in patients with high, and in those with low, blood pressure. As the prolongation may be associated with many different conditions the causal factor is probably sui generis.

Duration of Ventricular Systole in Abnormal Conditions.

Auricular fibrillation.—In a series of 38 cases the average duration of the R-T or Q-T period was 0·317 second—namely, of normal duration. In one case it was short, 0·24 second, and in four cases it was prolonged, 0·38, 0·38, 0·42, and 0·46 second respectively. The duration of ventricular systole in other cases fell within the normal limits, 0·28 to 0·36 second.

Auricular flutter.—The rapid succession of auricular deflexions in flutter often renders it impossible to estimate the duration of ventricular systole accurately. In three of our cases, however, the R-T period was 0·24, 0·26, and 0·24 second respectively. In the first two of these cases the same period during the less frequent normal rhythm was 0·35 and 0·34 second respectively. A comparable shortening of ventricular systole was observed in a case of paroxysmal auricular fibrillation, the systolic period during the paroxysm being 0·30 second, as contrasted with 0·36–0·38 second when the rhythm was regular.

Nodal rhythm.—The measurements in this group of cases are sometimes indefinite, but could be calculated in the electrocardiograms of four of our cases. During the paroxysms the ventricular systole lasted for 0·24, 0·34, 0·36, and 0·28 second, the average duration being 0·305 second, whereas between the paroxysms ventricular systole lasted for 0·28, 0·36, 0·36, and 0·38 second respectively.

Extrasystoles.—The R-T or Q-T periods were measured in electrocardiograms of 100 patients, of whom 77 presented ventricular, 15 auricular, and 8 nodal extrasystoles. The average duration of the ventriculo-extrasystolic period was 0·373 second, as contrasted with an average of 0·358 second for the normal beats. The average duration of the auriculo-extrasystolic period was identical with that of the normal beats—namely, 0·342 second. The average duration of the nodal-extrasystolic period was 0·339 second, as contrasted with an average of 0·348 second for the normal beats. The comparative duration of the R-T periods in 90 cases is shown in the table:—

	Extrasystoles.		
	Ventric.	Auric.	Nodal.
Equal to R-T of normal beats	19	4	2
Shorter than R-T of normal beats ...	14	7	4
Longer than R-T of normal beats ...	34	4	2
Totals	67	15	8

Prolongation of the ventriculo-systolic period was relatively more frequent, and more pronounced, in ventricular than in auricular or in nodal extrasystoles, and it is in ventricular extrasystoles that the greatest prolongation was observed. Thus in a man, aged 68, in whom the R-T period of the normal beats was 0·46 second, that of the ventricular extrasystoles was 0·53 second, an increase of 15 per cent. In another man, aged 79, the increase was from 0·49 to 0·68 second, nearly 40 per cent.; and in a woman, aged 68, an increase was from 0·31 to 0·46 second—namely, 48 per cent. The shortest R-T period of a ventricular extrasystole in our series was 0·24 second, the period in that case being equal to that of the beats of supraventricular origin. In ventricular extrasystoles the maximum curtailment of ventricular systole was from 0·38 to 0·33 second—namely, 14 per cent., in a man aged 52. In auricular and in nodal extrasystoles respectively the maximum duration of the R-T period was 0·40 and 0·43 second, while the minimum duration was 0·28 and 0·32 second.

It might be anticipated that the curtailment of diastole antecedent to an extrasystole would tend to prolong the R-T period of the premature, extrasystolic, beat. That this factor has to be reckoned with is shown by the fact that in some patients the prolongation of the extrasystolic R-T period is greater when the extrasystole occurs relatively early than when it occurs somewhat later. For example, in two patients with normal R-T periods of 0·35 second, the R-T of the earlier extrasystoles measured 0·33 second, whereas that of the later extrasystoles measured 0·31 second. The extrasystolic R-T period, however, is not invariably prolonged, and may be shortened; consequently the prematurity of the extrasystole is not the sole factor of its prolongation.

The most notable fact regarding the average R-T period in ventricular, auricular, and nodal extrasystoles is that it is respectively longer than, identical with, and shorter than that of the normal beats; and that an increase of the extrasystolic period is relatively frequent and pronounced when the stimulus for contraction does not pass to the ventricles from supra-ventricular portions of the heart. It may be concluded that an important factor in prolonging the R-T period of a ventricular extrasystole is the abnormal site at which the excitation wave starts, and consequently an abnormal course for its transmission through the ventricles.

Heart-block.—It is in heart-block that the duration of ventricular systole is most usually prolonged. In 23 electrocardiograms showing full heart-block the average duration of ventricular systole was 0·491 second, the extremes being 0·24 and 0·63 second. The duration in two cases fell within normal limits, 0·32, 0·33 second, in 20 cases above normal. In nine electrocardiograms of partial block the average duration was 0·423 second, with extremes of 0·33 and 0·56 second. In three cases of branch block the figures were 0·35, 0·36, 0·46 second.

It is, we think, obvious that disturbances of the rhythm of the heart are not the cause of this undue prolongation of ventricular systole. We have, too, found it present in three cases where the rhythm was normal. One patient, aged 18, had had an attack of influenza, during which he continued at his work, and subsequently developed pains in his chest. The heart did not seem abnormal, but the R-T interval measured 0·40 second. Six months later it measured 0·36 second. Two elderly patients with a high blood pressure and symptoms of cardiac insufficiency, and a normal rhythm, showed periods of 0·38 and 0·44 second.

Conclusions.

The cardinal feature of the analysis presented above is, we think, the association of this abnormality with heart-block. Heart-block is, of course, due to several causes, some of which act through the nervous system. But the most common cause is an inflammatory or degenerative lesion in the muscle. We do not imagine that a lesion in the vicinity of the bundle is the cause of the prolongation, but rather that lesions of similar type to those which obtain in the vicinity of the bundle, occurring elsewhere and diffusely, may be the cause. We know that a diffuse fibrosis of the heart is not uncommon in cases of heart-block.

Evidence of a progressive lesion of the myocardium is sometimes forthcoming in these cases. A man of 73 years was admitted into hospital on account of "nerve shocks" which had ensued nine weeks previously. He had full heart-block, and during the seizures the pulse at the wrist failed. The majority of the attacks were subjective, but a minority presented the typical appearance of the Stokes-Adams syndrome. He remained under observation for eight months and was only free from these symptoms for one month of that time. On his admission signs of cardiac failure were distinct, and as time went on became more extreme, though neither the frequency nor the severity of the attacks increased. Electros were taken for the first time in July. Q and S were absent, and R and T were positive and normal, save that the R-T interval measured 0·56 second. In October both had altered. R was now thickened on the ascending limb, and R-S was broad, measuring 0·18–20 second, while T was inverted. The R-T interval was unchanged. With increasing signs of cardiac insufficiency the electrocardiographic evidence pointed to the spread of the fibrosis from the main bundle to the branches, and presumably into the ventricular muscle as well.

A CASE OF

CARDIAC BALL-THROMBUS.

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ASSISTANT PATHOLOGIST AND MEDICAL TUTOR TO THE ROYAL INFIRMARY.

THE occurrence in the heart's chambers of loose thrombi having a laminated structure and a spherical or oval form has been noted from time to time since Wood first described such a thrombus in the *Edinburgh Medical and Surgical Journal* of 1814. To this formation the name of ball-thrombus has been generally applied. Welch points out that a ball-thrombus, properly so-called, presents the following three definite characters: (1) Entire absence of attachment and consequent free mobility; (2) imprisonment in consequence of excess in the diameter of the thrombus over that of the first narrowing in the circulatory passage ahead of it; and (3) such consistence and shape that the thrombus must not of necessity lodge as an embolus in this passage.

This definition excludes from the category of ball-thrombus certain cases in which an irregular soft mass has been found free in one or other of the chambers of the heart, and others in which small rounded thrombi have been found free in the heart after death, so minute that they must have been swept out of it in the blood stream had they actually been loose during life. The true ball-thrombus occurs in the left auricle, and in all the cases mitral stenosis is present, often to an extreme degree. The thrombus varies in size from rather less than that of a walnut to that of a hen's egg. The laminated structure and rounded form are ascribed to the deposition of fibrin from the surrounding blood upon a detached and freely movable body. In some cases the thrombus displays upon its surface a roughened area which may indicate its former point of attachment to the auricular wall. Some 20 cases in the literature conform to Welch's definition.

The following case which we have recently observed is typical of the condition.

Mrs. M., aged 49, was admitted on April 17th last to Dr. Edwin Bramwell's wards in the Edinburgh Royal Infirmary. She complained of shortness of breath and of giddiness occurring mainly on exertion, but occasionally while at rest. These symptoms had troubled her for an indefinite period, but had been more pronounced since an attack of pneumonia two months before admission. There was no history of rheumatism or of infective disease other than the pneumonia, but she had suffered from epileptic fits for 17 years. The patient was a thin, pale-faced woman of fair intelligence but with very defective memory. There was no cyanosis or œdema. The pulse-rate at the wrist was 60–70 per minute with complete irregularity and great variation in the strength of the beats. The apex beat was completely irregular and considerably more frequent than the radial pulse. The apex was in the fifth interspace just internal to the mammary line. There was well-marked epigastric pulsation. A short systolic murmer was audible at the apex and over the lower part of the sternum, and at the apex a short diastolic murmer immediately following the second sound could be heard at times. The second pulmonary sound was accentuated. The lungs presented no abnormal physical signs. There was a slight degree of polyuria, the maximum secretion in 24 hours being 88 ounces. The urine contained no albumin or casts. She was kept at rest and digitalis was administered. Under this treatment her condition improved considerably, and the disparity between the rates of the apex beat and radial pulse disappeared. She was allowed to get up for the first time on May 7th. The heart's action was still completely irregular and electrocardiograms taken on May 13th showed auricular fibrillation and preponderant right-sided hypertrophy. On the same day the patient was sitting up in bed when she suddenly became deeply cyanosed, drew a few gasping breaths, and died immediately.

Post mortem (May 14th).—Serous sacs: Pericardium and peritoneum healthy. No pleural effusion. Right lung adherent below and behind; left free. Heart shows enlargement affecting chiefly the left auricle and right chambers, which are covered with much subepicardial fat. The left ventricle looks atrophic, and its surface vessels are prominent and tortuous. There are some minute epicardial ecchymoses over the left auricle. The right auricle is considerably dilated, its wall much thinned, and endocardium thickened at places. The right ventricle is also dilated and shows some fatty infiltration of its wall. There is no clot in either auricle or ventricle; they contain only dark fluid blood. The tricuspid orifice admits four fingers and the valve cusps are slightly thickened towards their bases. The pulmonary valve is healthy. The pulmonary artery appears normal and contains only fluid blood; there is no contained clot or embolic blocking of it or of any of its main branches. Left auricle is markedly dilated and the auricular appendix is enlarged. On cutting into the auricle a ball-thrombus presents itself in the incision, being apparently free in the cavity. The thrombus is about the size of a walnut and greyish-pink in colour. The surface is somewhat irregular, granular, and pitted, and in some of the pits there is a layer of p.-m. clot. The shape is oval, but at one part there is a sort of flattened spur, probably indicating that the mass had been previously engaged in the auricular appendix. On section made up chiefly of closely packed concentric layers of old fibrin and is mostly cream-coloured. Peripherally there is a narrow zone of more recent greyish-red deposit. The endocardial lining of the left auricle is uniformly thickened. There is a considerable layer of adherent organising fibrin near the entrance to and partly within the auricular appendix. An isolated small oval and slightly raised plaque of similar deposit is present on the posterior wall of the auricle, both evidently of some standing. The mitral orifice is narrowed to a button-hole-like slit which only admits one finger, the cusps being greatly thickened and fused. The auricular surface of the valve shows irregular puckering and calcification. The chordæ tendineæ are bunched together and hard. The left ventricle is small, not notably dilated, and its wall somewhat atrophied though of normal colour. There is no naked-eye fibrosis. The aortic valve is healthy. The aorta shows slight early atheromatous change in the ascending part and the arch. The coronary arteries show a few very small atheromatous patches here and there. Both lungs show slight chronic venous congestion with some œdema. The right shows old and recent organising pleurisy over the lower lobe with two pale infarcts; the left shows slight apical scarring with a little limited fibrosis of lung substance. The stomach and intestine are unaltered, except for some prominence of lymph follicles in the ileum. The spleen is congested. The kidneys show marked chronic granular contraction. The other abdominal and pelvic organs, and also the brain, show no striking alteration naked eye.

Microscopically.—Ball-thrombus shows externally a coarse reticulum of fairly dense, deep-staining fibrin; internally layers of very old decolourised fibrinous material Some red blood cells are seen within the clot, probably due to percolation but very few leucocytes. Left ventricle shows a patchy interstitial fibrosis, especially round blood-vessels. Slight granular change in the muscle fibre. Left auricle: Vessels are congested and muscle fibres separated by young interstitial connective tissue. The endocardium shows fibrinous deposit, superficially recent, deeper exhibiting active organisation. Organisms are not demonstrable. Lung: A zone of fibrosis with lymphocytic reaction round the necrotic infarcted area; vessels in the immediate vicinity seen having their lumina obliterated by fibrous tissue. General emphysema and catarrhal change; heart failure cells numerous; organising pleurisy and slight bronchitis. Kidney shows advanced arterio-sclerotic change; many areas in the cortex where glomeruli are totally fibrosed; marked catarrhal change in the tubular epithelium. Spleen: Pulp spaces and capillaries greatly engorged; some slight fibrosis round some of the larger vessels. Liver: Slight central congestion with some secondary atrophy of liver cells. A very few isolated foci of lymphocytic accumulation are seen within the lobules.

Summary.—Mitral stenosis; early interstitial myocarditis; thrombosis in left auricle and free ball-thrombus; arterio-sclerotic kidneys; chronic venous congestion of liver, spleen, and lungs; infarctions of right lung with old and recent pleurisy.

Remarks.

Clinical interest in these cases has centred mainly round the two following questions: (1) May the ball-thrombus in the left auricle so modify the symptoms or signs of the accompanying heart lesion that its presence can be inferred with reasonable certainty? (2) Can the thrombus cause sudden death by plugging the narrowed mitral orifice? With regard to the first of these questions Von Ziemssen's observations are of interest. He described three cases of mitral stenosis, one with a ball-thrombus in the left auricle, the others with pedunculated thrombi in that chamber. Basing his opinion upon the symptoms observed in these cases, he suggested that a probable diagnosis of ball or pedunculated thrombus could be made when, in

addition to the physical signs of mitral stenosis, there were also evidences of severe interference with circulation in the left side of the heart (dyspnœa, cyanosis, and coldness of the extremities), all developed to a degree seldom seen in simple mitral stenosis. He laid special stress upon a symptom which occurred in all three cases and also in one described by Hertz—viz., circumscribed gangrene of the feet along with œdema and cadaveric coldness. He considered that the defective arterial supply to the lower limbs might sometimes be due to primary arterial thrombosis.

While one or two other cases of ball-thrombus have displayed similar symptoms, the majority have not done so. In this connexion it is interesting to note that Welch mentions, in discussing plugging of the abdominal aorta, that he found mitral stenosis in nearly 34 per cent. of 59 cases and is inclined to interpret many of them as primary thrombosis of the aorta. He also states that "the circulatory conditions in extreme uncompensated mitral stenosis seem favourable to the occurrence of arterial thrombosis, and if this view be accepted for the plugging of the abdominal aorta, the question arises whether thrombi frequently present in smaller arteries in association with this form of valvular disease may not oftener be primary than is generally supposed?" In view of these observations it seems unnecessary to regard the gangrene of the feet occurring in a few of the cases of ball-thrombus as indicating anything more than the existence of that extreme mitral stenosis which is almost always associated with this condition. In reviewing the cases in the literature, no other single symptom or syndrome emerges which may not be equally well displayed in severe mitral stenosis, altogether apart from this unusual thrombus formation. This is reflected in the fact that the condition is never diagnosed during life.

With regard to the second question, as to whether sudden death may occur from plugging of the stenosed mitral orifice by the thrombus, divergent views have been held by writers on the subject. It may obviously be supposed that the thrombus is forced by the auricular contraction into the stenosed orifice, and that remaining there it produces a sudden arrest of the circulation. To this it has been objected that a loose spherical body cannot readily occlude a shallow elliptical funnel so completely as to arrest circulation, and that unless the thrombus fits the orifice so accurately as to become fixed in it the regurgitant stream during ventricular systole will tend to displace it again. Welch notes, however, that an oval thrombus seems more likely to occlude the mitral orifice than a spherical one. It certainly seems significant that in five of six cases of sudden death the thrombus was oval, and that out of six cases of oval thrombus four died suddenly. It has also been pointed out that the thrombus cannot be pressed against the orifice by the auricular systole owing to the incomplete nature of the emptying of the auricle, dilated as it is in severe mitral stenosis. To this we would add that in the case observed by us in which the auricles were fibrillating, and so standing in the diastolic position, such a pressure of the thrombus down upon the orifice seems out of the question.

Two of the cases of sudden death, however, seem to prove the possibility of plugging of the orifice by the thrombus. In Osler's case the thrombus was found occupying the funnel-shaped space leading to the orifice, and he was of opinion that death was due to occlusion of the narrow opening by the thrombus. In Wadworth's case, in which death was apparently sudden, "the ball was clearly obstructing the mitral opening, causing practically complete occlusion." In both these cases the thrombus was of oval form. The conclusion reached from the evidence available is that in a case of cardiac ball-thrombus occlusion of the mitral orifice may occur and prove immediately fatal, but that this event is quite exceptional.

We desire to thank Dr. Edwin Bramwell for permission to publish this case.

References.—Professor W. H. Welch in the article on "Thrombosis" in Allbutt and Rolleston's System of Medicine, 1910, vol. vi., 691, and J. H. Hewitt in Johns Hopkins Hospital Reports, 1916, vol. xvii., 1, may be referred to for detailed systematic accounts of the condition and for references to all the recorded cases.

ORBITAL CELLULITIS.

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As oculist to the Corporation of Glasgow Fever Hospitals, which include Belvidere, Ruchill, Knightswood, and Shieldhall, it has been my fortune to see quite a few cases of orbital cellulitis, some terminating in abscess and others not. I have noted the following cases of orbital cellulitis in the order of their occurrence, and they exhibit four cases in scarlet fever, three in erysipelas, and one in puerperal fever. A ninth case occurred in an adult male who was admitted to Ruchill as suffering from cerebro-spinal fever with symptoms suggestive of D.T., and who developed an orbital cellulitis from venous sinus thrombosis. An incision made to relieve tension was followed by some relief to the proptosis, but the other eye became affected and the patient died a few days afterwards. As my appointment dates from 1914 only, I exclude for statistical purposes the first case which was seen in 1911. Thus in a period of rather under five years I have seen only eight cases in all of orbital cellulitis; of these three only occurred in scarlet fever.

CASE 1.—M. C., male, aged about 7, was seen first by myself at the Glasgow Eye Infirmary on July 11th, 1911, with an exophthalmos of the left eye. A definite history of scarlet fever was obtained at a later date, in which there were sore-throat, rash, and involvement of the parotid and submaxillary glands of the right side, followed by pain and swelling of the left eye. When seen first the feet were desquamating and the left eye was much proptosed. The child was transferred to Ruchill Fever Hospital, where on the following day under a general anæsthetic I incised a swelling at the inner canthus and found pus. A probe passed back touched bare bone over the ethmoidal plate. The cavity was mopped out with gauze and a gauze drain inserted. Unfortunately an ulcer with prolapse of iris rapidly formed in the cornea close to the wound in the conjunctiva. The wound did well and the proptosis subsided completely, but the anterior chamber remained full of purolymph. On the 24th hæmorrhage from the bowel set in and the child collapsed. Recovery, however, took place, and in a couple of days an attempt was made to save the eye by excising the prolapsed iris and washing out the anterior chamber. Ultimately it was decided to remove the eyeball, which was done on the 31st. Beyond an attack of chicken-pox further recovery was uneventful.

CASE 2.—M. F., female, aged 22, was admitted to Belvidere Fever Hospital on Oct. 19th, 1915, having been ill for about a week with scarlet fever and desquamation having commenced. Temp. 102° F., pulse 120, respirations 26. There were abundant rhonchi present in the chest. On the 31st the conjunctiva of the left eye became injected; next day the eyelids were œdematous, and an incision was made to relieve this. The following day I was asked to see the case. There was distinct proptosis and pain on backward pressure of the eyeball. A smear taken from the conjunctiva gave a negative result. On Nov. 3rd temp. was still 102°, hearing of the left ear was impaired, there was œdema of the left forehead, temple, and cheek, and patient was talkative although rational. Finding fluctuation on the following day, an incision was made through the outer third of the upper lid, pus evacuated, and a probe introduced touched bare bone in the orbital plate of the frontal bone. A culture taken from the pus evacuated showed a growth of staphylococci. By the 20th the patient was progressing well, but the proptosis remained; temp. was 99°. Breakfast had been taken well, but an hour later she vomited suddenly, became livid, and in another hour there began a series of convulsions, five in all, with intervals of about 15 minutes. On the 23rd the wound was enlarged to facilitate drainage. On the 27th a convulsion began and lasted three minutes, followed by three others, an hour's rest, and then four more. On Dec. 3rd the wound was enlarged still further to the inner side and pus was coming away freely. On the 16th pain was complained of in the back of the head. On the 23rd a counter-incision was made at the inner side and a drainage-tube passed through. By the 28th drowsiness had set in, there was slight rigidity on flexing the neck, and Kernig's sign was present. Internal strabismus was noted at a latter date, yawning, wasting, marked drowsiness, passage of the urine and fæces involuntarily. Death occurred on Jan. 9th following a slight convulsion.

Autopsy.—On removing the scalp an area of bare bone about one inch square was visible just above the operation wound of the left eye. The vault of the skull was removed. The cerebral blood-vessels were engorged and enlarged, and the dura mater was thickened. The dura was adherent over the left anterior frontal region. The brain was removed, and there was found to be a definite bulging in the anterior superior aspect of the left frontal lobe caused by a yellowish-looking mass. On horizontal section of the left frontal lobe this mass was opened up and a considerable quantity of yellowish-green pus was evacuated. There were three abscess cavities. The most anterior one was definitely encapsuled and was the size of a walnut. The two other cavities were smaller and seemed confluent, and were nearer the external surface and were not so definitely encapsuled. A sequestrum of bone the size of a threepenny-piece was observed at the operation wound, nearer the crista galli of the ethmoid and foramen in the frontal bone just below the supraorbital notch, covered by periosteum.

So far as my own observation goes there was no frontal sinus on the left side, so that there was no intervening air

space between the frontal lobe and the orbital cavity. The double abscess with thick capsule to the anterior one is of interest, and raises the question whether the orbital abscess or the cerebral abscess was primary. It was exactly a month following the onset of scarlet fever that the convulsions began, and the significance of cerebral implication was noted. The difficulty arises in the absence of symptoms in frontal abscess formation, especially where one has to deal with an orbital abscess in addition. Looking back it seems plain enough sailing, but not so in the middle of the illness.

CASE 3.—J. K., female, aged 15, was admitted to Knightswood Fever Hospital on Dec. 3rd, 1915, suffering from scarlet fever. Temp. fell to normal on the following day, but on the fifth it ran up to 104·4° F., with a pulse of 120 and a respiration of 24, severe frontal headache, pain in the eyes, and general malaise. On the 6th the headache was less severe, but there was definite swelling and œdema of the right upper lid. Movements of the eye were fairly good and the pupillary reactions were normal. There was considerable pain over the superciliary ridge. Temp. had fallen to 102·4°. On the following day the general condition had improved, the headache better, and the temp. was 100·2°, but the right eye was rather more œdematous and painful. I was asked to see the patient on the 8th, and found her fairly comfortable. The right eye was closed, the movements of the eyeball were limited particularly upwards and inwards, the pupil was reacting normally, the conjunctiva was somewhat bloodshot, there was slight proptosis of the eyeball, and œdema of the forehead was appearing on the right side. On the two following days there was no change in the condition practically and no fluctuation could be made out. On the 13th transillumination, showing no involvement of the frontal sinus or antrum, the patient was placed under a general anæsthetic and the parts explored with the right forefinger under the lid (a manœuvre which can be easily performed without undue pressure on the eyeball where proptosis is present); at the inner third of the supraorbital plate an elastic swelling was felt into which a Graefe knife was plunged through the lid and guided between the forefinger and the bone into a cavity. Pressure forceps introduced and opened allowed about a teaspoonful of pus to escape. The orbital plate was found eroded, and a drainage-tube was left in the wound. A growth of streptococci was got by culture from the pus. Recovery was quick and uneventful. When last seen on Feb. 10th, 1916, after dismissal from hospital, the wound was closed and the cicatrix was firm. There was a slight droop of the lid and headache was said to be present at times, but the patient looked well and healthy.

CASE 4.—J. W., male, aged 35, was admitted to Ruchill Hospital on April 3rd, 1917, suffering from erysipelas of the face following an injury from a rusty nail 14 days before admission. On admission the forehead, lids, and nose partially were involved. Incisions were made into the forehead, right upper lid, and over the lacrymal sac area at different times. I saw him first on May 3rd and found the right side of the head swollen, some fluctuation beneath the healed incisions, marked proptosis, and chemosis of the right eye. With a finger under the upper lid some fluctuation was detected, an incision made, and a probe passed back into a cavity behind the eyeball. A drainage-tube was left in the wound. An old incision over the temple was reopened and the parts drained. He was well and up by the 25th. Examination on June 5th showed that he had some vision left in the eye, and that the proptosis had almost disappeared.

CASE 5.—Mrs. B., aged 31, was admitted to Belvidere Fever Hospital on May 9th, 1917, as a case of puerperal fever, her child having been born on April 22nd. I saw the case on June 17th, when a history was given of sudden pain in the right eye eight days previously. Vision had fallen to bare perception of light and shade; tension of the eyeball was raised, the pupil obscured by fibrin, and there was proptosis. Fluctuation could not be found at any time, and no incision was made into the parts. Gradual recovery from the proptosis followed, leaving a shrunken eyeball. There was recurrent pain complained of in the left hip, but no swelling or hardening of the leg ensued. I gave a diagnosis of septic thrombosis of the ophthalmic veins.

CASE 6.—Mrs. S., aged 39, four and a half months' pregnant, was admitted to Ruchill Fever Hospital on Nov. 19th, 1919, suffering from erysipelas, which had started at the back of her neck on Nov. 11th, and spread over the face. Temp. was 100° F., pulse 116, resp. 28. On the 23rd a small superficial abscess involving the upper lid of the right eye and forehead was incised. It was noted then that there was proptosis and no vision. On the 24th I explored the right upper sulcus under a general anæsthetic, found some softness about the area of the ethmoidal cells, but no distinct fluctuation or elasticity at any part of the orbit. The eyeball was proptosed and fixed in the middle line, not pushed to either side. Pain was not complained of, the pupil responded to light, but there was no perception of light so far as could be made out. On the 26th an incision was made through the conjunctiva between the superior and external recti muscles, and the orbit explored by Hilton's method, but, as expected, no pus was found. A small corneal ulcer formed on the 28th, but gave no further trouble. By Dec. 1st the proptosis was decidedly improved and the movements of the eye were freer, especially in a downward direction. Two weeks later the movements were free in all directions, and the upper lid was movable. On Jan. 2nd, 1920, I examined the fundus with the ophthalmoscope and found the optic nerve atrophic. The pupil was now unresponsive, and there was no light perception. Presumably this was also a case of thrombosis of the ophthalmic veins.

CASE 7.—J. P., male, aged 29, was admitted to the Fever Hospital at Ruchill on Dec. 3rd, 1919, suffering from facial erysipelas. There was pain at the root of the nose, swelling of the forehead, and a temperature of 102·5° F. Proptosis of the right eye set in later and I was asked to see him on the 10th. There was marked proptosis of the right eyeball, œdema of the forehead, temple, cheek, and nose, but not distinct swelling of the upper lid, which could be raised easily with the finger. A probe passed under the lid showed that the upper sulcus was deep, but all manipulations of the eyeball, even under 5 per cent. cocaine, appeared to be very painful. The cornea was clear. There was some chemosis of the conjunctiva, which was snipped. Patient appeared to be in a deeply toxic condition. Shortly after the visit twitchings of the left side of the body began and terminated in death on the following day.

CASE 8.—S. M., female, aged 4, was admitted to Ruchill Hospital on June 18th, 1920, suffering from scarlet fever. She had been ill on the 17th, and the rash had appeared on the day of admission. The submaxillary glands were enlarged. On the 26th antistreptococcus serum was injected. On the 29th it was noted that the left eye had become inflamed, swollen, and painful. Next day patient was very exhausted and the eye was more swollen. Temp. 103° F., pulse 148, resp. 40. By July 1st the condition had improved and temp. had fallen to 102°; some more antistreptococcus serum and pituitrin were administered. I saw the child first on July 7th and found proptosis of the left eyeball, which was pushed downwards and outwards, although rotation of the eyeball was free in all directions. There was a swelling over the ethmoidal area. The nasal discharge was said to be profuse and temp. 99·2°. As it was stated that the proptosis and swelling of the lids were lessening and the condition generally improving, I left instructions that I was to be telephoned for at once if there was any change. I felt tempted at the time to explore the orbit, and but for the assurance that the condition was decidedly improved would have done so. I was sent for again on the 15th, a week later, and found the proptosis more distinct, the lids red and glazed, some chemosis at the inner canthus, and the pupil widely dilated. Under chloroform, with the point of the little finger inserted between the œdematous lids, I touched an elastic swelling in the direction of the ethmoid plate. With the finger in position a knife was plunged into this swelling through the upper lid above the dome of the lacrymal sac guided by the tip of the little finger. Pus came freely, the wound was enlarged, dilated with drainage forceps, and packed temporarily with gauze which was to be replaced later by a tube. The ethmoid plate was found to be bare and rough. By the 18th there was marked improvement, the pupil had contracted again, the proptosis was lessening, and there was little discharge. On the 22nd the little patient was not so well again, the temperature was 100·6°, and the pulse-rate 152, but by August 1st the condition had again improved. On August 8th a new feature had appeared in the form of a mastoid swelling of the right ear, not on the affected side. Some discharge had been noticed coming from this ear for some time previously. An incision made through the periosteum by Dr. J. Frew, the house physician, drew off pus, and was followed by a most excellent recovery so far as refers to the mastoid condition. Cultures taken from the orbital abscess and from the mastoid both showed a diphtheroid bacillus of a club-shaped type and of, in some cases, a large size. Examined under a general anæsthetic on Sept. 13th it was found that the bone was still bare although not rough, there was no redness of the parts, and very little discharge, and practically no proptosis. The child was physically well when last seen, and the mastoid soundly healed. She is, of course, still under observation in the hospital.

Remarks.

The cases occurring in the course of scarlet fever are of particular interest, and so far as my experience goes are far from common. Knies, in "The Eye in General Diseases," quotes Nettleship as reporting two cases of optic nerve atrophy in scarlatina, one following orbital suppuration. Ball, in "Modern Ophthalmology," states that "typhoid and typhus fevers, scarlatina, pyæmia, and puerperal septicæmia, and especially facial erysipelas, may all cause orbital cellulitis." De Schweinitz, eighth edition, says that orbital cellulitis may follow in the wake of scarlatina, typhoid fever, or influenza, or may be a result of meningitis, but that the most violent types occur with facial erysipelas. I quite agree with this reference to facial erysipelas as I find that the most violent types in rapidity and in deformation of parts occur with facial erysipelas. In the International System of Ophthalmic Practice, Medical Ophthalmology, Knapp states under the heading scarlet fever, "orbital abscesses have been observed in a number of cases, and the lacrymal apparatus has also been involved." Under the section on Diseases of the Nasal Accessory Cavities he emphasises the importance of inflammation of these sinuses producing orbital cellulitis and abscess. I think there can be little doubt that these sinuses are the danger area for orbital cellulitis in scarlet fever particularly and in nasal sepsis generally. Römer, in his text-book of ophthalmology, translated by M. L. Foster, states that of all cases of orbital cellulitis blindness follows in 20 per cent., and quotes Birch-Hirschfeld that 17 per cent. die from meningitis, abscess of the brain, or thrombosis of the cavernous sinus. In "Bacteriology of the Eye," by Axenfeld, translated by A. Macnab, will be found in a chapter on the orbit an excellent description of the connexion between infectious diseases of the accessory sinuses of the nose and those of the orbit.

I am deeply indebted to Dr. T. Archibald and Dr. W. M. Elliott, superintendents of the hospitals, and to the many house physicians, too numerous to name individually, for valued assistance in treatment of the cases and in compiling these notes.

Clinical Notes:

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

A CASE OF

NON-FATAL RUPTURE OF ANEURYSM OF THE DESCENDING AORTA.

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THE occurrence of thoracic aneurysms of large size without physical signs is well known, the case here recorded being of this type. There would seem to be little doubt that the first hæmoptysis was due to the erosion of one of the bronchi, probably the left, by the sac, with subsequent rupture and healing. While under my observation I was not able to persuade myself that the cough had any tendency to "brassiness."

J. L., a master-builder, aged 45, was sent to the Mount Vernon Sanatorium as a case of advanced pulmonary tuberculosis. On admission he gave the following history. He had been a regular soldier for eight years, during which time he had served in India and Canada; had not served during the Great War. When in India contracted malaria, and states that he now has "attacks" every two months; denies venereal infection. Has suffered for many years from cough in the winter time, but does not think it has become worse of late; has been in the habit of taking whisky freely. Except for slight dyspnœa he states that he was quite well until 12 months ago; in May, 1919, developed left-sided pleurisy, for the treatment of which he stayed three weeks in an infirmary; then felt quite fit and commenced work, which he continued for six months, when a recurrence of the pain again caused him to stay in the infirmary for eight weeks; returned home for Christmas, although not feeling quite fit. On Dec. 31st, 1919, while asleep, had a severe hæmoptysis of about 6 pints; the blood brought up was dark red in colour and contained many clots. Returned to the infirmary, where he remained till his admission to the sanatorium in March, 1920. For some time past there appears to have been a definite slow loss of weight; complaint on admission was of pain in the back and shortness of breath; also volunteered the information that for about six months past he had suffered from a slight difficulty in swallowing solid food. Cough, although present, does not trouble him much; there has been no vomiting.

Condition on admission.—The patient was a well-nourished man, weighing nearly 12st. His complexion was florid, and his expression was anxious. There was well-marked dyspnœa and orthopnœa, but without cyanosis. Chest moves fairly well and equally; a tendency to "barrel-shape," but no bulging or pulsation is visible. No venous distension of chest or neck; no enlarged supraclavicular glands. Apex beat not palpable; neither thrill nor shock. Percussion note good all over chest, although not definitely hyper-resonant. Area of cardiac dullness was obliterated; no areas of dullness detected. On auscultation, moist sounds audible throughout the lungs. Heart sounds barely audible; no murmurs detected. Pulse of high tension; radial pulses equal in volume and time; no tracheal tug. No involvement of the cervical sympathetic or recurrent laryngeal nerves detected. Abdomen: slight rigidity in upper part to palpation; no solid viscera palpable. No abnormality of the central nervous system found.

The subsequent history was: March 26th, 1920—sputum examination: No tubercle bacilli found. 27th—blood examination: Cells normal in appearance; no obvious leucopenia; no malarial parasites or melanin seen. The differential count was F.G.O., 59 per cent.; S.L., 20·3; L.L., 10·3; L.H., 5·0; C.G.O., 5·4. An Arneth differential count of leucocytes gave (I.), 32; (II.), 34; (III.), 28; (IV.), 6; (V.), 0; with a von Bonsdorff figure of 208.

April 7th: Complains of severe pain in the back. On palpation of the abdomen considerable tenderness (? hyperæsthesia) in the right hypochondrium, especially marked over the gall-bladder. Palpation resisted in this region. On gentle palpation of the epigastrium an extraordinary paroxysm of coughing and clutching at the bedclothes occurred, accompanied by great pain. During last few days streaky hæmoptysis, and cough very troublesome. The sputum consists almost exclusively of frothy mucus. Now informs me that he has urethral stricture which requires dilatation at regular intervals.

April 14th: At 8.5 P.M. sudden hæmoptysis of bright red blood about 5-6 pints in quantity, and he died almost immediately. Throughout his illness he had been apyrexial, and without acceleration of the pulse-rate.

Post-mortem examination (April 18th).—Rigor mortis present. Pleural cavities half full of dark fluid blood. Numerous, fairly firm adhesions at the apex, base, and posterior part of the left pleura. Right pleural cavity free from adhesions. Both lungs bulky and emphysematous. Normal pericardial fluid; heart slightly enlarged in all dimensions. The descending thoracic aorta was the seat of a large fusiform aneurysm, about 6 in. long by 2½ in. in diameter; this partly filled with adherent laminated clot. Sac of aneurysm densely adherent to surrounding structures. Rupture found to have occurred into the left bronchus. Aorta the seat of extensive calcareous atheroma throughout, with many patches of softening. Heart dilated in all chambers. Heart muscle pale and soft. On section of lungs no evidence of pulmonary tuberculosis, old or recent, found. Liver soft and fatty. No cirrhosis. Spleen very small, with patches of perisplenitis. No gall-stones. Stomach healthy and nothing abnormal found in the œsophagus. No erosion of the vertebræ. The remaining viscera were not examined.

Remarks.

The interest of this case lies partly in the patient's recovery from such a profuse hæmoptysis as occurred in December, 1919, and partly in the difficulty in the differential diagnosis. The symptom-complex did not suggest pulmonary tuberculosis on admission, in spite of the suspicious association of a primary pleurisy with hæmoptysis. The malaise, anorexia, &c., so common in tuberculosis, were absent. The information derived from examinations of the blood and sputum afforded support to this view.

Cirrhosis of the liver may be accompanied by hæmatemesis. The strong alcoholic history made one bear the possibility of this diagnosis in mind, but dysphagia is not usual in these cases. The other symptoms were not those of cirrhosis. Malignant disease of the œsophagus was dismissed as there was no pain on deglutition, but merely some difficulty associated with the act. There was, again, an absence of the extreme emaciation seen in these cases. The diagnosis made on admission was "thoracic aneurysm low down" on account of the absence of involvement of the cervical nerves. The extreme epigastric hyperæsthesia suggested irritation of the intercostal nerves. X ray examination was unfortunately not possible.

A NOTE ON THE INCIDENCE OF

ASCITES AND ŒDEMA IN MALARIA.

BY J. I. ENRIGHT, B.A., M.B., B.CH. N.U.I.,

CAPTAIN, R.A.M.C.

OWING to the many diverse symptoms manifested in malaria, I desire to draw attention to a peculiar type which is of extreme interest from the point of view of early recognition and treatment. I refer to the onset of the malarial attack—whether it be primary or secondary—which is accompanied by ascites, œdema of the feet, puffiness of the face, frequency of micturition, and vague discomfort over the lumbar regions. Cases exhibiting these symptoms, especially in a primary malaria, are so suggestive of nephritis that, in all probability, they are often treated merely as such without the recognition of any malarial element, with the result that their true origin is not suspected and accordingly quinine is not administered. In two months ten such cases were encountered. They were found to be chiefly subtertian infections, and all responded readily to quinine treatment, with rapid disappearance of the ascites, œdema, and urinary symptoms. Strange to say, not a single urine contained casts, but there was invariably a very appreciable amount of albumin, which quickly disappeared after a course of quinine treatment.

I append a history of one typical case as indicative of the series:—

The patient, a German, aged 25, recently captured on the Palestine front, was admitted to hospital 24/11/18, with a diagnosis of nephritis. He complained that about ten days before admission he had "influenza" and that two days after its onset his abdomen and feet became suddenly swollen. He had frequency of micturition, being compelled to rise several times during the night, and in addition pain over both lumbar regions. He was absolutely certain that he had never had any previous malaria.

On examination the patient was thin and anæmic. Temperature on evening of admission 102·4° F.; it remained continuously elevated for the succeeding five days with only slight daily remissions. No history of a rigor could be obtained. Pulse was 100, respirations 18. Stools of normal consistency. Lungs, heart, liver, and spleen normal. General anasarca; abdomen markedly swollen, with distinct fluctuation and dullness of both flanks; feet and legs œdematous; the face had a puffy appearance, with involvement of the eyes.

Urine analysis.—Specific gravity 1018; acid albumin; sugar present; phosphates nil; no casts.

Blood examination revealed subtertian parasites, and the patient had a course of intramuscular quinine (gr. 18) for ten days, followed by oral quinine. After the first intramuscular injection the temperature fell to normal; few days later the patient showed signs of a general improvement and expressed himself as feeling distinctly better. The ascites and œdema became gradually less pronounced, and at the end of two months had completely disappeared. On 22/1/19 patient was quite well and was accordingly discharged from hospital.

Discussion.

At first sight the diagnosis in this case was confusing. There was no history of previous malaria, the temperature was not of the usual malarial type, and the patient said that he had not had a rigor at any time during the illness. All these facts tended to confirm the primary diagnosis of a subacute non-specific

nephritis. The remaining cases, however, were secondary to previous malaria, all of them having had attacks before. Eight were malignant infections and two benign. The one prominent symptom common to all, whether the infection be benign or malignant, is the advanced anæmia. Of obvious importance is the outstanding fact that no cardiac lesions were demonstrable; neither could the existence of a myocarditis be substantiated by any physical means. The pulse, on the contrary, was strong and of good volume.

How, then, account for this remarkable œdema? During a wide experience of malignant malarial infections in prisoners of war gained during the last two years this is the first occasion on which œdema has occurred in association with malaria. It may be suggested that the œdema is a disease sui generis, but against that suggestion is the fact that no similar cases have occurred amongst many German prisoners admitted with dysentery and other diseases. Hence the connexion between malarial infection and the production of œdema would seem to be established; this view is supported by the disappearance of these symptoms after quinine treatment. I contend that there is evidence for connecting this "nephritic" form of malaria with blackwater fever, for the following reasons: During the same period as these cases were observed two severe attacks of blackwater fever took place amongst the same group of prisoners. In both cases blackwater fever ensued after a considerable previous malarial infection; one case was fatal. It occurred to me that the same pathological basis might account for the "nephritic" character of the cases previously cited as for the blackwater fever, and that they might possibly represent aborted attacks of the latter. It is of course impossible to do more than suggest, without an extensive pathological investigation, which could not then be carried out, that such a connexion does exist. It is probable that the malarial toxins in these cases have an affinity for the renal epithelium, causing a subacute nephritis without actual destruction of the renal cells, but with the passage of albumin, and sometimes red cells as well, in the urine.

Had any great degree of hæmolysis taken place, and had the liberated hæmoglobin been secreted by the kidneys, from a clinical point of view at any rate, these "nephritic" cases would be justly classified as blackwater fever. These exceptional cases of blackwater fever without a history of antecedent malaria may possibly be analogous to the clinical case I have cited in which the œdema was the first manifestation of a malarial infection. The close relationship between this type of malaria and nephritis adds one more to the long series of clinical varieties of malaria, and provides still another trap for the unwary clinician.

NOTES ON A CASE OF HEAT-STROKE WITH HYPERPYREXIA.

BY E. SETON PATTISON, M.R.C.S.ENG., L.R.C.P.EDIN.,
SURGEON, R.M.S. "OSTERLEY."

AT 6 A.M. on August 18th, 1920, while in the Red Sea, a male passenger, aged 36, was seized with heat-stroke. There was much moisture in the air at the time—the wet bulb registering 87° and the dry 90°. He became immediately unconscious, with widely dilated pupils which did not respond to light. The temperature in the axilla was 110° F. (verified by three thermometers). He was stripped and massaged with blocks of ice for periods of 15 minutes' duration, in the intervals being dried with hot towels. After one hour of this treatment the temperature dropped to 108°, at the end of the second hour it was 106·4°. An injection of strychnine and digitalin was then given, and in another hour the temperature fell to 105°. After the fourth hour the temperature was 101·6°. The ice was then discontinued. He then developed violent epileptiform convulsions, which continued for four hours. An injection of morphia and atropin was then given, and he had some intermittent sleep. The next day the temperature again rose to 106°, and the ice massage was resumed, the temperature gradually falling to normal, and he made a satisfactory recovery.

Reviews and Notices of Books.

THE ASSESSMENT OF PHYSICAL FITNESS.

By GEORGES DREYER, C.B.E., M.A., M.D., Professor of Pathology in the University of Oxford, in collaboration with GEORGE FULFORD HANSON, late Lieutenant, American Medical Air Service. London: Cassell and Co. 1920. Pp. 116. 10*s*.

THIS little book consists mainly of tables, and is based on the principles developed by Professor Dreyer and published in THE LANCET of August 9th, 1919, and in later numbers. His constants for the normal relationships between body weight, sitting height, and chest circumference have recently received confirmation in the results of other researchers, and in this book the powers and constants are worked out in great detail, so that greater accuracy is attained than was the case with the earlier more approximate figures. Detailed tables are contained in the book showing the normal weight for any trunk length, the normal weight for any chest circumference, the normal circumference of the chest for any given trunk length, and the normal vital capacity in relation to all three measurements, the latter being worked out in three classes according to the occupation or previous athletic history of the individual. Separate tables are included for males and females, and, in addition, all the tables are in duplicate, both the Metric and the English systems of measurements being used. Clear instructions are given with regard to the taking of the measurements, and many examples are included to illustrate how the tables may be used. These tables should prove extremely useful, since they enable anyone to see at a glance and without any calculation whether the vital capacity is within normal limits, and so to estimate the physical efficiency of the individual. Not only can the vital capacity be estimated with regard to three separate measurements, but also an indication is obtained of any abnormality of physical proportions.

Much valuable work has been done in the Department of Pathology at Oxford in the standardisation of normal measurements, and this book contains the ultimate results of many of these, including those of the relation of stem length to body weight, in which much of the pioneer work was done by Dr. Ainley Walker, though his name does not appear in this particular publication. Briefly, therefore, the value of this book lies in the fact that it enables a good and rapid estimate to be formed as to the normality or abnormality of any subject's weight, since, even if the person is abnormally lanky or thick set, an average of the figures obtained from the stem length and chest circumference will lead to the practical exclusion of such factors, and so not only is an estimate of the physical build obtained, but also the more important functional test of the vital capacity can be estimated in relation to all these measurements. It should, therefore, find a wide sphere of usefulness among all who have to estimate physical fitness.

ORTHOPÆDICS FOR PRACTITIONERS.

An Introduction to the Practical Treatment of the Commoner Deformities. By PAUL BERNARD ROTH, M.B., Ch.B., F.R.C.S. London: Edward Arnold. 1920. With 57 illustrations. Pp. 195. 10*s*. 6*d*.

THIS little book gives what it sets out to give, a clear account of the treatment of the commoner deformities likely to be met with in everyday practice. No attempt is made to enter deeply into pathology or theory, and the methods of treatment described are those which the author has found to be successful; others are ignored or condemned in a few words. This method ensures brevity and lucidity, an advantage to the practitioner, but it must result occasionally in a somewhat one-sided view. It is not always made clear when the views given are those personally held by the author, with which the majority of orthopædic surgeons might strongly disagree. The condemnation accorded to certain lines of treatment—for example, to

the ordinary operation for hallux valgus—is so blunt and emphatic as to confuse and perplex the unwary. As a rule, however, these personal views show out so strongly as to be easily distinguishable. The book, as a whole, may be recommended as simple, practical, and straightforward, clearly expressed, and based for the most part upon sound principles.

THE MEDICAL ANNUAL, 1920.

Edited by CAREY F. COOMBS, M.D., F.R.C.P., and A. RENDLE SHORT, M.D., B.S., F.R.C.S. Bristol: John Wright and Sons, Ltd. Pp. 498. 15*s*.

THE Medical Annual provides many interesting and instructive articles and will be warmly welcomed by a large number of busy practitioners this year as in years past. If it records no discovery of first-rate significance, it justifies the claim of its editors that the profession has been diligent in observation and has made steady progress in building up that storehouse of knowledge upon which all the great scientific adventurers must draw. It is worthy of remark that a cure recorded in the present volume (p. 160) is attributed to an article in the previous number of the Annual. The case was a very persistent one of granuloma venereum, which yielded rapidly to intravenous injections of tartar emetic.

The editors comment on the difficulties of publication at the present time. This is no doubt the explanation of the extreme rarity of references to work published in the last 12 months. The bulk of the references is to work done in 1918 or the first half of 1919. There is thus no reference in an otherwise excellent article on the medical aspects of flying to the work of our French colleagues, Cruchet, Moulinier, Maublanc, and Ratié.[1] There are also, as must necessarily be the case in a volume representing so many views on so many different subjects, some statements which we had rather not seen repeated. We consider it unwholesome doctrine to preach (table p. 311) that "the itch mite" is "too small to look for." The acarus may be hunted successfully with an ordinary pin and is easily distinguished with a simple lens. More complete cross reference would be helpful to the general reader. Why should not a reference be found under "tuberculosis" to the paragraph on "tuberculosis of the eye" (p. 134), to "genital tuberculosis" (p. 345), and even to "alcohol" (p. 2), though the discussion of the action of this drug in tuberculosis is not so full as it might have been.

A classified list of books published during the year, an official and trade directory, a list of medical institutions, and another of current periodicals add to the value of the book. The whole is thoroughly well produced and the price very moderate.

LECTURES ON MEDICINE TO NURSES.

Seventh edition. By HERBERT E. CUFF, M.D. London: J. and A. Churchill. 1920. With 29 illustrations. Pp. 257. 7*s*. 6*d*.

Dr. Cuff's well-known text-book, "A Course of Lectures on Medicine to Nurses," has now reached its seventh edition. The text is clear and concise, deals with essential facts, omits unnecessary detail and is admirably illustrated by 29 diagrams; the present edition contains a lecture on pulmonary tuberculosis and sanatorium treatment. Unfortunately, the high level of general excellence is not uniformly maintained. The chapter on massage is ineffectual and of little value, theoretical or practical, the paragraphs dealing with the treatment of ringworm by Rontgen rays fail to emphasise the important fact that treatment is given to the entire scalp and not only to the infected area, whilst in his lecture on the nursing of a case of tracheotomy Dr. Cuff departs from academic teaching and considers it permissible to feather the outer tube before removing it from the trachea. In a future edition the author would do well to add here and to eliminate there, replacing the chapter on massage by comprehensive notes on the nursing of cases of heart disease. These alterations would add materially to the intrinsic value of his work.

[1] See THE LANCET, July 31st, 1920, p. 250.

JOURNALS.

The Journal of Physiology. Edited by J. N. LANGLEY, Sc.D., LL.D., F.R.S. Cambridge University Press. 1920. Vol. LIV. Nos. 1, 2: Pp. 1–128. 10*s*. No. 3: Pp. 129–202. 6*s*.—The Recovery Process of Excitable Tissues, Part I., by E. D. Adrian. The conductivity and excitability of a nerve fibre after the passage of an impulse gradually return to normal during the relative refractory period and then pass through a stage in which both these functions are increased above their normal value—the "supernormal period" of recovery. This stage is not always present and its extent is variable; it depends on the $H^{\cdot}$ ion content of the fluid with which the nerve is in equilibrium. If the fluid is on the acid side, the phase is well marked and increases with increasing acidity; if on the alkaline side, the phase is absent and this holds good for the recovery of conductivity as well as that of excitability. The phenomenon of the "treppe" or staircase was first described in cardiac muscle (1871)—i.e., in resting cardiac muscle the second of two contractions may be greater than that of the first. This increase in contractile power above its resting value is part of the supernormal phase of recovery. It is associated with an increased excitability, and is present when the heart is perfused with an acid fluid and absent with an alkaline. The staircase effect in skeletal muscle, however, is an entirely different phenomenon, and depends on the increased duration of the contractile process in the early stages of fatigue and is not affected by the $H^{\cdot}$ ion content of the perfusing fluid. The maximum supernormal excitability during recovery of nerves in an acid fluid is very slightly less than the excitability in a neutral fluid, whereas the resting excitability is very much less. The minimal concentration of ions required to excite during the supernormal period in an acid fluid is equal to the minimum required in a neutral fluid, although the resting value in acid fluid is very much greater. The author suggests and partly discusses an hypothesis to account for these facts.

Experiments on the Regulation of the Blood's Alkalinity, Part I., by H. W. Davies, J. B. S. Haldane, and E. L. Kennaway. The observers made experiments on themselves—the experiments being carried out in a large air-tight respiration chamber of about 260 cubic feet capacity—to study the effects of breathing increased percentages of CO_2, forced breathing, ingestion of $NaHCO_3$ (by eating quantities from 30-57 g.). The dissociation CO_2 curve of human blood cannot be altered by short periods of forced breathing or breathing moderate excess of CO_2. It is greatly altered by ingestion of alkali. In the acidosis of breathing excess of CO_2 the urine becomes more acid and its NH_3 increases. In the alkalosis of forced breathing or bicarbonate ingestion it becomes alkaline the NH_3 decreases or disappears, and the rate of bicarbonate excretion may be very rapid. Acetone bodies generally appear in the urine of alkalosis. The excretion of alkali during forced breathing does not appear to be compatible with the theory that the kidneys reabsorb a fluid of constant composition from a glomerular filtrate. The alveolar CO_2 is greatly increased by ingestion of alkali. The analytical chemical methods used are fully described.

The Muscular Mechanism of the Diaphragm, by Grace Briscoe. It would appear that the diaphragm should not be regarded as a single muscle, nor as constituted by two lateral halves, but should be regarded as consisting in the crura and the two costal portions; the crura acting mesially and the costal parts arising from the ribs laterally, the crura being the more essential parts, the costal parts being in a manner supplementary to the crura. The crural and costal portions are developed from different muscular sheets in the embryo, the crura receive their blood-supply directly from the aorta, the costal portion from the intercostal arteries and internal mammary artery. The phrenic nerve on reaching the diaphragm divides into two portions, the posterior branch supplies the anatomical crus on that side and certain adjacent muscle, while the anterior branch supplies the remainder or costal portion. The author made investigations chiefly on anæsthetised and pithed cats by making an opening in the chest wall—on one side a pneumothorax—attaching hooks to the crural and costal portions, and recorded the results, in order to determine any differences in the form and mode of contraction of these two parts and to bring the results into relation with certain observed clinical phenomena, including the view that extension of the spine induced the crural type of breathing and flexion of the spine initiated the parietal form of breathing. The movements of the diaphragm during respiration can be seen best, when the animal is lying flat, through a window made by removing the posterior portions of the seventh and eighth ribs; movements of both crus and dome can be watched. The general movement of the whole diaphragm during inspiration is downwards, the greatest descent taking place in the region of the central tendon. The latent period was usually shorter in the crus than the dome, whether the contractions resulted from stimulation of the phrenic nerve or when they occurred during spontaneous breathing.

When the spine is flexed the contraction of the dome is usually increased and that of the crus diminished; on extension of the spine the reverse occurs. Distending the abdomen with saline to imitate ascites, whereby the abdomen was distended and the diaphragm pushed up into the thorax, increased the energy of contraction of the dome and diminished its latent period relatively to that of the crus. The energy of contraction of the dome increases as the intra-abdominal pressure rises with injection of the saline. The effects of varying stimuli to the phrenic nerve, section of this nerve, and lateral flexion of the spine are described. The differences found in the energy of contraction and in the latent period of contraction are due to the changes in stretching or tension of the different parts of the diaphragm, brought about by alterations in posture. Extension of the spine produces a relatively increased action of the crus; flexion causes a relative increase in the action of the costal portion. It is plain that the action of the two parts of the diaphragm can be modified by various factors, the modifications being due to changes in the tension of the different parts, such tensions being altered both by various positions of the body and by the degree of intra-abdominal pressure. The experimental observations seem to confirm the hypothesis put forward, and based on clinical observation,[1] that the diaphragm should not be regarded as a functional whole, but rather that differentiation should be made between the action of the crural and costal portions of the muscle.

The Action of HCO_3 Ion and of Morphine on the Respiratory Centre, by J. B. Collip. The administration of sodium bicarbonate by intravenous injection may result in increased respiratory activity (dog). The instillation of sodium bicarbonate into the spinal fluid results practically at all times in definite stimulation of the respiratory centre.

The Relation of the Animal Cell to Electrolytes: II., The Adsorption of Hydrogen (Ions) by Living Cells, by J. Gray. Trout eggs under normal conditions live in water containing a very low concentration of electrolytes, while the egg itself has a much higher electrolytic content. The author studied the possible uptake of electrolytes when the eggs are exposed to such substances in abnormally high concentrations. There exists positive evidence of the absorption of the hydrogen ion and the hydroxyl ion. When living trout eggs are exposed to dilute concentrations of hydrochloric acid the hydrogen ion is taken up, but the concentration of chlorine ions in the external solution remains practically unchanged. To replace the hydrogen ions removed from the solution a kation (possibly potassium) is given up by the eggs. The uptake of the hydrogen ion by the cell follows the laws of an adsorption process. The equilibrium between the external solution and the cell is apparently established by means of the outer membrane of the cell. This process constitutes Loeb's "membrane effect."

The Four Phases of Heat-production in Muscle, by A. V. Hill and W. Hartree, is the subject of an elaborate paper which does not lend itself to a condensed report, as the authors' summary alone occupies more than two pages.

In No. 3 the following subjects are dealt with. The Partition of CO_2 Between Plasma and Corpuscles in Oxygenated and Reduced Blood, by J. Joffe and E. P. Poulton; The Relation of Oxyhæmoglobins to the CO_2 of the Blood, by J. M. H. Campbell and E. P. Poulton; Colorimetric Determination of the Reaction of Blood by Dialysis, by H. H. Dale and C. Lovatt Evans; The CO_2 Carrying Power of the Constituents of Plasma: The Alkali Reserve of Blood, by J. Mellanby and C. J. Thomas. The space at our disposal does not allow even of condensed reports on all these allied, very technical, yet practical problems, and only a few conclusions can be noted. At all pressures of CO_2 up to 600 mm. the "true plasma" contains more CO_2 than the corpuscles in equilibrium with it. As the pressure of CO_2 increases there is a steady migration of acid from the plasma into the corpuscles, so that the dissociation curves of the plasma and the corresponding corpuscles are quite different from the dissociation curves of separated plasma and separated corpuscles. On reduction of blood there is a migration of acid from corpuscles to plasma. If venous blood were completely reduced the transport of CO_2 would be carried out chiefly by the corpuscles, but as venous blood is not usually more than 40 per cent. unsaturated the transport of CO_2 is carried out by corpuscles and plasma in nearly equal proportions. The proteins of blood combine directly with CO_2 when the reaction of the blood is very much more acid than ever occurs in the body. The blood proteins act as acids combining with sodium, and compete for it with the CO_2. At all pressures of CO_2 the C_H of the corpuscles is greater than the C_H of the plasma. The CO_2 is completely expelled from the blood by the blood-pump because the proteins acting as acids are sufficient to combine with all the sodium of the blood. According to Mellanby and Thomas the CO_2 is combined in the blood in two ways—(1) adsorbed by the proteins, and (2) as $NaHCO_3$; the transport of CO_2 is effected by the protein, and the alkali reserve of the blood is constituted by $NaHCO_3$ and by protein.

[1] Arris and Gale Lecture, by J. C. Briscoe, 1919.

The Relation Between Respiration and the Pulse-rate, by F. A. Bainbridge. A close but not invariable relationship exists between the degree of activity of the respiratory centre and the rate of the pulse. The author describes his experiments on cats anæsthetised with ether to determine which or any of several hypotheses that have been proposed to explain the facts. No evidence was obtained either that impulses pass by irradiation from the respiratory to the cardio-inhibitory centre, as suggested by Traube, and alter the tone of the latter, or that afferent impulses, capable of reflexly affecting the pulse-rate, pass from the lungs to the cardio-inhibitory centre, as suggested by Hering. The tone of the respiratory centre is modified by changes in the reaction of the blood, being increased by a fall and diminished by a rise in the p_H of the blood. The author concludes that the regulation of the pulse-rate is carried out primarily by the heart itself, and the respiratory movements influence the pulse-rate only in so far as by bringing about changes in the circulation, they call into action the regulative mechanism possessed by the heart.

Journal of Laryngology, Rhinology, and Otology. Nos. 8 to 10, 1920.—Mr. Sydney Scott contributes to the August number an article on the ear in relation to certain disabilities in flying. As a result of the examination of 62 flying officers he came to the conclusion that the rotation tests did not serve to discriminate qualities, either favourable or unfavourable, to individual flying ability; he mentions the importance of repeated auto-inflation during descent, and describes an extremely retracted condition of the drums sometimes seen by inspection immediately after landing.—In the September number Sir Charters Symonds describes the technique of laryngectomy, and gives a short account of the indications for and results of the operation. In this article, which may be considered as an addendum to his paper in THE LANCET of March 20th, 1920, he lays especial stress on the danger of contamination by septic secretions from the growth and its prevention by postponing the opening of the trachea till as late a period as possible, by packing the exposed intermuscular spaces and by keeping the upper end of the divided trachea covered up with gauze after its division. Dr. Kerr Love contributes an interesting paper on the Mendelian inheritance of congenital deafness.—In the October number is an illustrated description by Mr. Wilfred Trotter of his method of lateral pharyngotomy for the exposure and removal of malignant growths about the upper aperture of the larynx. For large tumours in this region the operation includes division of the lower jaw, and is, needless to say, a very formidable proceeding.

British Journal of Children's Diseases. Vol. XVII. July-September. Edited by J. D. ROLLESTON, M.D.—In a report of a case of Antenatal Intestinal Obstruction, with some remarks on other forms of intestinal obstruction in infants, Dr. Sydney A. Owen and Mr. Norman Lake describe the case of an infant who at birth had marked abdominal distension, but otherwise appeared normal. The mother had hydramnios to the amount of five pints. Other signs of intestinal obstruction developed, and laparotomy, which was performed on the second day of life, showed that the obstruction was due to strangulation of the intestine about a foot above the ileo-cæcal valve by a band representing the remains of the vitelline artery arising from the mesentery, and descending to the upper surface of the bladder. Death took place the day following the operation, and the autopsy showed that the entire gut below the site of obstruction was pervious. The writers review the recent literature relating to defects of the intestine, including complete and partial defects, occlusions, and atresiæ, and Dr. Sydney Owen reports five cases in infants aged from five days to six months, illustrating the difficulties encountered in the diagnosis of actual or suspected intestinal obstruction.—In a paper on Hereditary Syphilitic Aortitis Dr. E. J. Stolkind reviews the literature and comes to the conclusion that there is not a single proved case of hereditary syphilitic aortitis in children above one year of age, and especially in adolescents and adults, though he admits that such cases may exist.—Dr. Parkes Weber reports a case of Suprarenal Sarcoma of the Robert Hutchison Type in a girl aged 5 years, with an account of the necropsy and histological examination, and comes to the conclusion that his case, like other cases of the Hutchison type, is really a malignant hypernephroma of the suprarenal medulla not of sarcomatous but of neuroblastomatous nature.—In the second part of his paper on Stigmata of Predisposition to Bone and Joint Tubercle, Mr. W. C. Rivers compares subjects of bone and joint tubercle with normals in respect of certain personal stigmata—viz., red hair and ichthyosis—his clinical material being derived from the study of children at the Treloar Hospital at Alton, the King Edward VII. Hospital for surgical tuberculosis at Sheffield, and patients of all ages

notified during the last six years in the Barnsley district, of which he is the tuberculosis officer. He found that red and reddish hair was nearly twice as frequent in bone and joint tubercle as in the ordinary population, and that ichthyosis was at least twice as frequent in bone and joint tubercle as in non-tuberculous children.

School Health News (New York).—The June issue of this monthly journal, published for the information of school teachers by the Health Department in New York, deals chiefly with emergencies arising out of the hot season and vacation times. The Board of Education Section, referring to the high schools of New York, states: "To carry out successfully the follow-up work in correcting physical and hygienic defects a health officer must be in charge with a free period each day for the purposes of consultation; the clearing up of files then becomes almost automatic." In order to obviate the shirking of physical training students excused the practical side have to work thoroughly and accurately at the subject and are examined on it from the theoretical standpoint.

New Inventions.

ELECTRICAL RECORDING OF THE PULSE.

THE chief difficulties in the use of a polygraph are that it is working somewhere near the limit of accurate measurement by a purely mechanical device, that it is necessarily subject, to some extent, to lag produced by the inertia of the moving parts, and that small changes or abnormalities in the character of the pulse may, so to speak, be "rounded off" by the general "overshoot" of, or friction in, the recording levers. A more exact method of following the course of the pulse movements might be of value both in diagnosis and research. The great value of the electrocardiogram is due largely to the fact that it is produced with but little inertia or delay, and without much distortion of the natural phenomenon by the physical or mechanical characteristics of the recording instrument itself.

Successful preliminary experiments have been made with an electrical device for recording the pulse at any one of the numerous exposed arteries of the body.

The point at which the pulse is felt is covered with a drum or funnel connected to a tube in a manner similar to that adopted with most polygraphs, so that the movements of the artery are reproduced in the column of air in the tube. Instead, however, of making the small changes of pressure in the air record themselves by moving a tambour and working a lever—a system which necessarily shows inertia, overshoot, and friction—the device to be described uses these air currents to cool a very fine hot copper wire, whose degree of cooling is recorded on a string galvanometer of the type employed in taking the usual electrocardiogram. A spiral of fine copper wire, in the instruments hitherto made about 0·011 mm. in diameter, is mounted inside a little brass pipe in such a way that the movements of the

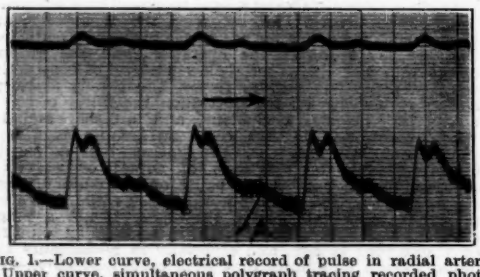

FIG. 1.—Lower curve, electrical record of pulse in radial artery. Upper curve, simultaneous polygraph tracing recorded photographically. Time in 1/5 sec. Record reads from left to right.

pulse cause the column of air in the pipe to pass over the wire. The wire is joined by copper leads to a Wheatstone's bridge; the battery terminals are connected to a 2-volt cell, and the galvanometer terminals (through a key) to the string galvanometer. The wire is heated by the current through it and a balance is obtained on the bridge, so that no current runs in the galvanometer. The cooling produced by the air travelling past the hot wire, in time with the pulse, causes a fall of resistance in the wire, the bridge is thrown out of balance, and a corresponding current runs in the galvanometer. Typical records are shown in Figs. 1 and 2. It might be supposed that this instrument would show lag in the cooling or heating of the wire; if the wire be too thick it will, but by employing sufficiently thin wire this lag can probably be reduced to negligible dimensions, and the pulse be made to impress itself practically instantaneously on the hot wire. The sensitivity is high, so that the string galvanometer may be used with a tight string and very rapid movement, and the whole arrangement be made to record with little lag or "rounding off" of the natural characteristics of the pulse.

It should be noted that the record made is not a pulse tracing in the ordinary sense; the displacement of the string, recorded on the photographic paper, would, if

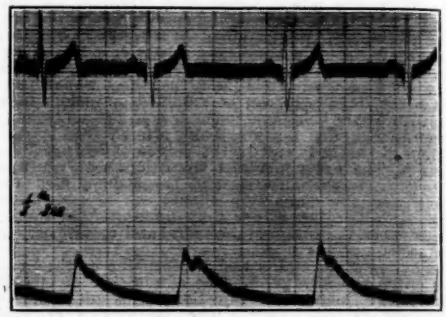

FIG. 2.—Lower curve, electrical record of pulse in radial artery. Upper curve, electrocardiogram—i.e., record of electric change in the heart. Time in 1/5 sec. Record reads from left to right. [The electrocardiogram is not very steady owing to leakage from A.C. mains.]

the hot wire were infinitely thin, represent not *displacement* in the artery (as in the ordinary polygraph record) but *rate of displacement*. Actually it probably represents something between the two. Consequently the usual appearance of the record may be widely modified and require interpretation.

Obviously a good deal of work must be done on the physical properties of the instrument before it is properly understood. There is little doubt, however, that interesting records of pulse movement in many parts of the body can easily be made at once by its means, and their analysis may lead to a fuller knowledge of the finer characteristics of, and variations in, the circulating system and be of value both to physiology and medicine. A pulse record showing the subtle characteristics and variations of the lower curve in Fig. 1 must be capable of detecting abnormalties either in the heart, the valves, or the arteries. At present, however, observations have been made only on one individual, and it will be necessary to carry out experiments on various subjects before the value of the record in diagnosis can be established.

It is possible to obtain a double-fibre case for the string galvanometer, enabling simultaneous records to be made of the pulse at any two desired spots on the body. Such an arrangement was used in making the records shown in the figures. It will shortly be possible to obtain from the Cambridge and Paul Instrument Company a device by which four simultaneous records can be made. Two of these will have the ordinary sensitivity of their string galvanometer and so will be suitable for electrocardiograms, phonocardiograms, or pulse curves. The two additional records will have a less sensitivity, but, it is hoped, sufficient for pulse curves. By this means it will be possible to record simultaneously four pulses, or three pulses and the usual electrocardiogram, and so to infer with considerable accuracy, among other things, the velocity of a pulse-wave in an artery. This velocity gives a measurement of the elastic state of the artery.

The experiments made hitherto merely show that the instrument undoubtedly works. It is hoped to carry out at Manchester an extensive series of observations on the physical, the physiological, and the clinical aspects of the device. It is probable that the instrument can be considerably improved, both as regards the accuracy of its records and its convenience in use. It will remain, however, a simple, cheap, and easily worked accessory for any laboratory or hospital which already possesses a string galvanometer.

I am greatly indebted to the Cambridge and Paul Instrument Company, and especially to Mr. C. C. Mason, a director of that firm, for the manner in which they have turned my suggestion into an actual working instrument. The records of Figs. 1 and 2 were taken in their works at Cambridge.

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Professor of Physiology, Manchester University.

THE LANCET.

LONDON: SATURDAY, OCTOBER 9, 1920.

Industrial Medicine and St. Mary's Hospital.

WHATEVER be the future of the British Empire, future historians must place two things to its credit. Here has originated that industrial development which in a short century and a half has altered the conditions of human life more than all the events of the thousands of years which elapsed between the dawn of civilisation and 1760; and while that development has subjected the human organism to a new series of stresses and strains no one will deny that with it there have been introduced many changes of a beneficial nature. Here also originated, owing to the initiative of Sir JOHN SIMON and Dr. WILLIAM FARR in the mid-period of last century, the great science of preventive medicine. The early reports of SIMON, which contain the pioneer work of GREENHOW, indicate how important was the part played by industrial development in the health of the nation. CHADWICK, THACKRAH, and GUY, each in his own sphere, had preceded GREENHOW, CALVERT HOLLAND invaded the same country, while the mantle of these workers fell later on OLIVER. Invaluable work was done, but it was mainly concerned with the rank weeds of industrial disease—plumbism, anthrax, fibroid phthisis, and the like; probably the popular idea is inherited from these first efforts that industrial medicine is concerned only with a small group of occupational diseases.

Meanwhile preventive medicine has been developing in other directions. At first it concentrated on such things as infectious disease, food-supply, drainage, water-supply, and unhealthy dwellings; but with the dawn of the twentieth century it has been changing and becoming more personal in its application, and to be effective it must become more and more personal. First, health at birth has been tackled through prenatal, maternity, and infant clinics; next health during growth has been supervised through school clinics; lastly, the health of the adult has escaped organised attack but has come in for some meed of public interest. Here it is that occupation, which more than any other influence throws unusual strains on the vigour of adults, provides at once the reason for action and the means. Modern industry has not only altered the geographical distribution of the population so that the human race is no longer locally restricted in number by the food raised from the soil on which it lives, but it has grouped together masses of the people in great industrial concerns. Supervision of the health of children is rendered possible by the grouping of attendance at schools. Industry groups adults according to occupation whether on the coalfields or in metalliferous mines, in the textile mills of Lancashire or Yorkshire, in shipbuilding yards, in engineering establishments, in boot and shoe factories, in the pot-banks of the "five towns," in foundries, in laundries, on the railways, in Government departments like the Post Office and Telegraph Service, in food factories, in great stores, in clerical work, and in many other trades. This grouping is ready to hand; and the last few years have seen a flood of light thrown on the advantage to be gained from investigating health in industry, not merely to improve the lot of individual groups of workers, but to ascertain the influences subjection to which causes the human organism to succumb to this or that form of morbidity. The voice of the small medical staff of the Factory Department has not been unheard; the work of the Health of Munition Workers' Committee has done much to arouse public interest, and point the necessity for expanded effort; the short-lived activities of the Ministry of Munitions showed how the work could be undertaken; the welfare movement in factories is a lay effort advancing ahead of medicine; the Industrial Fatigue Research Board continues to explore the territory. Some few pebbles from the shore of knowledge have been gathered; more must be gathered; all must be used.

To-day efforts to teach industrial medicine are only made at Manchester and in the Welsh School of Medicine; in both cases the classes are in connexion with post-graduate work for the Diploma of Public Health. No attempt anywhere is made to train the future general practitioner to know something of the working-day life and risks of those among whom he is to spend his life. Credit is particularly due to the authorities of St. Mary's Hospital for taking steps to remedy the omission, and proposing to establish a chair of Industrial Medicine, the holder of which shall be abreast of modern knowledge, shall instruct the students, and be himself a research worker in the field. Few people probably appreciate how wide an industrial field London itself provides for research; it is easily the greatest industrial centre in the world; nearly every industry is represented there. Without going from London there may be studied problems of labour wastage and lost time; the psychology of labour unrest with its dependence on accidents and morbidity; the excessive incidence of common complaints in certain trades; the particular affections, such as writer's cramp, caisson disease, or plumbism; and the wide subject of industrial fatigue. Sir ALMROTH WRIGHT, in putting forward an appeal for funds, is marked out as a leader in medicine with a sure vision for present needs and opportunities. The appeal was made public at a luncheon on Oct. 1st in connexion with the commencement of the new academic year. We wish it every possible success. We have in these columns noted from time to time the progress of industrial medicine, and hope that when the session for 1921–22 is inaugurated we shall be able to announce that St. Mary's Hospital has established the new chair and appointed the first professor of Industrial Medicine.

Physical Measurements.

THE relations of mathematics to medical problems, and the standards of physique which should be adopted in the selection of aeroplane pilots are subjects which have both received recently much attention in the medical press, not only in our own country but also in others. Both these subjects are dealt with in a paper by Dr. C. B. HEALD and Mr. B. THOMSON, which we publish in our present number, and which we welcome, since it affords an interesting comparison on a series of individuals of the tests for physical fitness developed by Lieutenant-Colonel MARTIN FLACK with the vital capacity test as elaborated by Professor

GEORGES DREYER. There is a growing tendency in modern medicine, especially applied at present in the measurement of health and normality, to attempt to find definite tests of easy application, which may be used to assess the physique of an individual in such a way that the result may have relatively an absolute value and be less and less dependent on the judgment and clinical experience of the medical man concerned. Dr. THOMAS LEWIS has emphasised the obvious fact that in the realm of the circulation and its disorders physical signs and methods, which may serve the purpose of the moment, must ultimately be replaced by methods of precision, which are so essential for the progressive study of disease. Not only must the methods employed for the advancement of medicine be exact, but they must be capable of accurate description in writing so that constant and world-wide standards may be set up. These principles are equally true for the other systems of the body, and are already being applied, and are giving in some directions valuable results. The importance, therefore, of the subject, which is dealt with by Dr. HEALD and Mr. THOMSON is very real, and it would indeed be useful if the data on the 124 individuals, on which their paper is founded, could be published in detail, so as to allow consideration from points of view somewhat different from those of the authors.

The figures given support both FLACK'S and DREYER'S contentions, and in addition the various groups given in the first table show an interesting agreement between the results of FLACK'S tests and DREYER'S formulæ, and this in spite of the fact that the authors have used the original approximate powers and constants given by DREYER rather than the more accurate ones included in his later book "The Assessment of Physical Fitness." On the other hand, as opposed to the group results, the assessment of physical fitness of the individual sometimes showed marked discrepancies between the two methods—a result not surprising in view of the factors concerned which we discuss later; and it has been the object of the authors to develop a system of dealing with the figures obtained, so that respiratory efficiency may be estimated by a combination of the two methods, any deficiency in one direction being disregarded if there is a corresponding super-efficiency on the other series of tests. This they have attained by combining the various results of FLACK and DREYER into two composite figures, and plotting these composite figures against one another, obtaining a graphic result, "which is almost incapable of formulative expression," but which serves to divide these various individuals into fit and unfit groups on the basis of the combined tests. This division corresponds closely with that arrived at on general grounds as a result of the medical experience of the examiners. It is this graphic representation of the results of two very different methods of examination, with the attempt to represent the whole by one assessing figure, which forms the new departure of the paper, and the part which must show itself able to resist criticism. The authors themselves point out that mathematics should be applied to medicine only cautiously, and that human efficiency in its entirety can only be represented by a very indeterminate formula; and the question arises whether their own formula may not itself be too indeterminate to have any real meaning. "Only a limited number of causes of any result can be measured," they state, but they also hold that the FLACK tests are measures of "respiratory competency" and the DREYER figures of "physical proportion." This latter statement cannot possibly be upheld. While the relationships between weight, stem length, and chest circumference are those of physical proportions, this is far from true in the case of the vital capacity, which is to a very large extent a measure of the efficiency of the respiratory muscles. The rapid variations in vital capacity that have been shown to occur in tuberculous subjects by DREYER and BURRELL are best explained on a basis of varying muscular power, while similarly the improved vital capacities which are found to develop as the result of physical training in normal individuals—giving differences of 700 c.cm. or more in a short period of time—can only be explained on the basis of an improved use of the respiratory muscles. Both systems of tests must be considered therefore as dealing with respiratory competence. On the other hand, the FLACK tests are something more than this; they have proved themselves excellent in estimating psychological characteristics, such as the will power of an individual, especially if an examination of the pulse is conducted during the fatigue test, when evidence of the ability of the subject to hold out in spite of a failing pulse will often be obtained. How large a part is played by psychological factors will be seen by anyone who conducts two series of FLACK fatigue tests, if in one the individual is given no indication of the standard expected, while in the other series the subject is set a high standard, with the explanation that he will be held unfit unless he can reach it. The second series will give much higher readings.

We must conclude, therefore, that the graphic representation arrived at by the authors estimates the efficiency of the individual, assessing him mainly on his physical fitness, to a less extent on his power of determination, and to some extent perhaps on his rate of metabolism or other factors. It remains questionable whether the flying man should not be chosen very largely on psychological grounds rather that physical, provided his physique is above a definite minimum, a high physical standard being only insisted on when the subject intends to fly at very great altitudes. In this case a definite and separate estimation of his physique and will power would be more useful than the conglomerate figure obtained by the method here suggested. On the other hand, the principle of plotting the results of different tests against one another and the hope expressed of obtaining by this means "useful efficiency factors for all the principal organs of the human body" do carry real weight in the development of medicine, and express an aim, which we can only hope will reach ultimate achievement.

Anatomical Material.

MATERIAL for anatomical purposes has been increasingly short for some time past. Teachers of operative surgery in particular have found their occupation gone. Even if some amelioration in the conditions is now apparent it seems to us, nevertheless, that the question is too important to be kept in the background. A recent letter from the Ministry of Health to boards of guardians, dealing with this subject, has led to an outburst of foolish sentiment in the daily press. In contrast to this Professor J. E. FRAZER'S letter to the *Daily Express* of Sept. 21st cannot fail to do good, and is a worthy example of sound and

convincing argument, from which we extract two paragraphs:—

A knowledge of human anatomy is not heaven-sent, nor can it be acquired from books, or pictures, or from word of mouth. The infinity of detail, all important, of bodily structure, can only be appreciated and understood by actual dissection and hard work under skilled direction, and the successful study of the science of medicine—which includes surgery and its specialities—depends ultimately on knowledge of the body. Again, the proper performance of surgical operations cannot be learned by looking at surgeons operating, however eminent they may be. It has been remarked by a writer on this matter that it would be as reasonable to expect to be chosen to keep goal for England because one had watched every cup match played for years past.

This, then, brings us up against the ugly fact that, if the young surgeon cannot acquire dexterity on the dead, he must obtain it at the cost of the living. So far as anatomy is concerned, it has from ancient days been recognised as an absolute necessity for medicine, and to-day, when the field of medicine has grown to such enormous size, the need for study of the body is still more insistent. Anatomy and the development of the body lie at the foundation of all medical knowledge and advance. The war, in which the medical services reached a stupendous height of accomplishment and brilliant effort, has led to still greater appreciation of anatomy and its value, and anatomists are faced with many new problems to be solved.

The need is imperative; the medical schools *must* have material. This was recognised years ago by Parliament, and that body by its enactments intended to meet the need in a decent and lawful manner. Yet the wishes of Parliament have been neutralised—it is an open secret—by those whose duty it was to carry out the details of the provisions of the law. It is absurd for a serious Act to be passed through the representative house in order to meet the necessities of a learned profession indispensable to the nation, and then for the power to make it effective to be left so largely in the hands of half-educated local politicians and their servants. It is fully time that the departments responsible for administering the Act were allowed to entertain a new conception of their duties, and were given power to carry their views to completion. It ought not to be possible for any local body to go against the wishes of Parliament in a matter so vitally affecting the education of the country's medical men; and in many ways it would be a step forward if local boards and councils were deprived of the power to inter, whether the body be claimed or not, without sanction from the central authority. All deaths occurring in rate-aided institutions would thus come under the notice of proper authority, and it should not be beyond the wit of man to find a way through which such an arrangement would be compatible with burial within the usual time. Unclaimed bodies, in the face of the very natural sentiment of relatives, must form the main source from which anatomical supply is to come, and it would in all probability meet the demand if the provisions of the law were faithfully carried out. If some method of making the law effective is not put into operation before long the way will be opened to unfortunate illegal practices, and everybody, whatever the issue, will regret the passivity which had allowed a good law to fall into desuetude, as has happened very largely, for example, to the law dealing with bribery and corruption.

LIVING-IN ON CANAL BOATS.—The Minister of Health has appointed a committee, with Mr. Neville Chamberlain, M.P., as chairman, to inquire into the practice of living-in on canal boats in England and Wales and to report whether any alteration in the practice is desirable. The secretary of the Committee is Mr. Arthur Jones, of the Ministry of Health, and communications for the Committee should be addressed to him at the Ministry of Health, Whitehall, S.W.1.

Annotations.

"Ne quid nimis."

THE INTRODUCTORY ADDRESSES.

DURING the week a number of schools were formally opened by members of the medical profession, whose addresses provided much variety in the subject-matter chosen to interest those present. We only comment upon a few, but their style and matter show that there is room for the delivery of these orations, when they desert the stereotyped pattern. One address appeared to be directed to medical students; two dealt with subjects of importance to certain sections only of the audience of teachers, fathers, mothers, and prize-winners; while the fourth, delivered at the opening of the Middlesex Hospital Medical School, was so broad in scope that no one present could have failed to find certain points of special interest therein. Professor Swale Vincent, whose address we print in full, dwelt on problems of medical research and education; on the tedium of the formal lecture and the evils of examinations; on the proper department for the teaching of histology; and on the need for "generous and complete" State support for the universities. Dr. A. M. Gossage at Westminster on Sept. 30th also noted the urgency of enlisting Government help to meet the financial requirements of medical teaching schools. On the other hand, Professor George Adami, as will be seen in the earlier pages of this issue of THE LANCET, gave his hearers a thoroughly contentious address. We may say at once that, without agreeing with Professor Adami in some of his main deductions, even while we acknowledge the accuracy of most of his facts, we none the less think it an excellent thing for admittedly controversial points to be discussed in this uncompromising manner. Clinical units have been started in the greatest of our London medical schools, and have at the back of them a fairly universal support. Incidentally Professor Adami was, of course, wrong in suggesting that St. Mary's Hospital either had in any way contracted itself out of Government aid or stood aloof from the movement for the institution of clinical units. As we pointed out in THE LANCET (Sept. 18th, p. 621) the clinical unit system is, owing to much energy and some altruism on the part of those concerned, in full being at this hospital, which also was the earliest to obtain from the Board of Education the grant as a technical school. Undoubtedly Professor Adami indicates the way in which clinical units can do harm if they are run in the wrong spirit, but to us it seems there is no necessity to run them wrongly.

From Empiricism to Science.

The freshmen who attended the opening of the session at King's College Hospital may well be envied by their colleagues at other medical schools, as they were privileged to listen to a speech especially prepared for and addressed to students. Mr. Richardson Cross deliberately ignored controversial problems of current interest only to medical graduates. He sought to make no impression outside the walls of his old hospital, to convey no message but that of encouragement and stimulation to the student in the form of a simply worded review of the development of the modern doctor. After rejoicing in the association with the present new hospital of a hall of residence for medical students, since he believed strongly in collegiate life for students, Mr. Cross alluded to the distinguished men on the staff of King's College Hospital in Lincoln's Inn-fields 35 years ago. He described their personal characteristics and special skill, but pointed out that in those days the greatest operative skill was frequently made useless by the blood poisoning that followed after operation. Wounds nearly always healed with suppuration; some did well, others recovered very slowly or gave rise to the blood poisoning, pyæmia, and so forth, then known as hospital diseases. The mortality after amputation or similar operations was not less than 25 per cent.; it reached even 40 per cent. in England and Scotland at certain times; while at one

time in Paris it was even higher. Few dared to open the abdomen, or even the chest; but subcutaneous operations performed by William Adams and others usually did well. So did those about the face, where the good nutrition of the part seemed to withstand the unhealthy tendency. Spencer Wells, in 1864, attributed these conditions to the unhealthy atmosphere of the hospital ward. It seemed that operations in private houses did better than in hospital, and those in smaller hospitals better than in large ones. At Glasgow it was decided to pull down and enlarge the hospital on the block system, and improve the bed space; a new hospital was built, but with little improvement. Mr. Cross went on to explain that Lister, then professor at Glasgow, had long recognised that the unbroken skin provided protection to the damaged tissues shielded by it, and after studying Pasteur's work, realised that suppuration was the result of putrefaction or fermentation in exposed tissues; that organisms, the causes of putrefaction, must be excluded, and suppuration must be prevented from occurring at all. He then evolved this as a new principle in surgery; the treatment or lessening of suppuration after it had taken place was another and a more difficult problem. Mr. Cross then described the early experiments of Lister, who became associated with King's College in 1877, and proceeded to emphasise the revolution in surgical methods following on his work. He spoke of the early attempts to apply bacteriology to surgery and gave some indication of the special problems of infection and immunity still unsolved. He continued with a few words of counsel to the student on the preparation for his life's work, which he described as the alleviation of suffering, the prevention of disease, and the improvement in all conditions of life. The student could watch the teacher's method of investigation and stimulate his own powers of observation free from responsibility. Good habits of investigation and method should be acquired early, and the student must learn to distinguish between those who argue from facts and those who argue from notions and ideas. Mr. Cross concluded with a brief statement of his views on the present position and future outlook, which the students who listened might well regard as axiomatic.

"The work of the general all-round practitioner gives him but little time for study or recreation, many are overworked and underpaid. Surely the present working of the panel system is unsatisfactory. The State, through the Ministry of Health, is making much use of medical services, and will more and more extend them. We shall, no doubt, continue willingly to give our best services, our time and knowledge towards the highly-skilled treatment found in the voluntary hospitals, but where the State or Poor-law undertake the responsibility in dealing with the sick, a proper payment will be expected for the services rendered by medical men. And we must continue to be a self-governed profession so far as that is practicable."

Teachers and Their Reward.

In his inaugural address Dr. Gossage called sympathetic attention to the immense increase in the number and complexity of the subjects which the medical student had now to be taught compared to what was the case when he was a student. He did not desire to frighten the student who was just entering on his professional education; he had no need to be afraid. It was true that he would have to work rather harder than the previous generation, but all the fresh knowledge that he had to absorb was prepared and rendered easy for him by his teachers. It was with the teachers that Dr. Gossage was more concerned. They had had to acquire this knowledge with much pain and toil, and the work required of them in this rendering of new discovery fit for student absorption was increasing by leaps and bounds. Teaching was the least well paid of all the professions, and, as in other branches of secondary and technical education, students' fees were completely inadequate, even to supply the necessary apparatus, much less to pay a salary commensurate with their labour to the teachers. In the past professional men taught their future colleagues in their spare time while they earned their livelihood by the practice of their profession, and were repaid because the successful teacher obtained the largest professional reward. To some extent in the more purely professional subjects of medicine, surgery, and midwifery this still holds, and it is a great advantage to the student to be taught by active practitioners. Other subjects of the curriculum, such as pathology, are now demanding the whole of the teacher's energy, leaving him no time for practice, and, even if there were time, eminence in these sciences does not lead to remunerative professional work. There is, too, a tendency both here and in other countries to demand that a major part of the teaching in even medicine, surgery, and midwifery shall be done by whole-time teachers and assistants. In America, and to some extent in England, the difficulty is partly met by the munificence of private individuals, who have endowed universities and schools for medical education; on the continent of Europe the financial responsibility is undertaken by the Government. London, the largest English centre for medical education, has never received much assistance from endowment, and in these days when it is becoming impossible to raise from the charitable even sufficient money for the hospital treatment of the sick, further endowment of education becomes excessively unlikely. It is therefore to the Government that we shall turn for adequate provision so that in material and personnel the schools shall be equal to the best. Before undertaking any such responsibility the Government must be expected to insist on economy of management, and we may expect it to insist on a reduction in the number of competing schools and hospitals, which may be considerably reduced by amalgamation. The proper use of London's unrivalled opportunities is also likely to be demanded, so that the teaching possibilities of the numerous special hospitals and infirmaries shall be utilised, and a further multiplication of unnecessary institutions, to the detriment of those already existing, prevented.

GONORRHŒAL HEART DISEASE.

ACCORDING to Professor N. Jagic and Dr. O. Schiffner,[1] of the Sophia Hospital of Vienna, affection of the heart is generally regarded as a rare complication of gonorrhœal infection. Kolle and Hetsch estimate the frequency of gonorrhœal septicæmia at about 0·7 per cent. of all cases of gonorrhœa that come under treatment, but the heart is involved in only a small proportion of the septic cases. The best known and by far the most frequent form of gonorrhœal heart disease is gonorrhœal endocarditis, which, like endocarditis due to other causes, may be divided into verrucose and ulcerative. All writers are agreed that gonorrhœal ulcerative endocarditis has a predilection for the aortic valves, which according to Külbs are affected three and a half times as frequently as the mitral valves. The clinical symptoms are usually those of pyæmia, and the prognosis is thoroughly unfavourable. The verrucose form, of which Professor Jagic and Dr. Schiffner record an example, relatively frequently represents the only localisation of gonorrhœal infection. Its favourite situation is the mitral valve. In some instances complete recovery takes place, but in the majority of cases a valvular defect remains. Most writers are agreed that gonorrhœal pericarditis is not infrequent, but according to Hofmann it hardly ever occurs alone, but is always found associated with other gonorrhœal heart affections or inflammations of other serous membranes. Myocarditis of gonorrhœal origin is less known, especially when it occurs in an isolated form, than either endocaritis or pericarditis. Professor Jagic and Dr. Schiffner record two cases, both of which occurred in the course of a generalised gonorrhœal infection, but after the local affection had subsided. The symptoms were those of ordinary infective myocarditis, and dilatation of the heart was found on physical and orthodiagraphic examination. As they had an opportunity of seeing these three cases of gonorrhœal involvement of the heart within a relatively short time, the writers

[1] Medizinische Klinik, Sept. 19th, 1920.

conclude that gonorrhœal affections of the heart, especially mild forms of myocarditis, occur more frequently than is generally supposed, and suggest that some of the myocardial lesions of later life, for which there is no obvious cause, are of gonorrhœal origin.

REFUSAL TO SERVE.

Mr. Ernest Hutchinson's play, entitled *The Right to Strike*, now being presented at the Garrick Theatre, London, was described by its producer at the end of the first night's performance as "not propaganda," and dramatic critics have added that it is certainly not art; but for all that it is a study of medical polity which is likely to interest the public and to help the medical profession to clarify its own views by seeing them in the limelight. The plot is simple in outline and filled in boldly and sincerely. The staff of a small valley railway, serving as sole access to a North-country manufacturing town at the head of the valley, decides to down tools with such completeness as to ensure the absolute acceptance of its own terms. Medical supplies being thus held up, the staff of the local infirmary at once counters with an efficient and well-organised motor-transport service to the railway junction. On the first day a car is overset by a steel wire stretched across the road and the newly-wedded doctor, son of the local medical practitioner, is killed on the spot. Under the leadership of the local surgeon the medical strike then becomes as complete as the railway strike, medical help being denied completely to the strikers and their families. The wife of the signalman who leads the railwaymen gets an obstructed labour, presumably owing to a transverse presentation, from which neither the handy woman nor the local practitioner, who soon secedes from the medical strike, is able to deliver her. The surgeon, who is keeping vigil by the graveside of his murdered friend and colleague, is sought for high and low throughout a night in which the woman's straits become ever more painful and urgent. When found he hesitates long, but, the railway strike being over, he is persuaded by the deceased doctor's young widow to perform the operation—it is evidently a Cæsarean section—which is to save his chief opponent's wife. This is the crowning scene, and the curtain goes down as the surgeon tears off his coat and waistcoat and calls (he actually bawls) for the local practitioner to give the anæsthetic. The play is not concerned merely with the broad human interest of the situation, but introduces with humour and a faint flavour of malice the solicitor of the "Medical Association," who, while strongly condemning the local strike, is unable to prevent it. There is a measure of general support from the younger section of the medical profession in the country, but meanwhile the surgeon's name is removed (the shrift is dramatically short) from the Register by the action of the "Medical Council" and he is forbidden to practise. The play may be helpful to those members of the body politic, whether medical or no, who cannot otherwise picture the results of withholding their personal service. Like the illustrations to Foxe's "Book of Martyrs," the scenes would enliven the pages of a trade-union manual or the prospectus of the Medico-Political Union.

IDIOPATHIC GANGRENE OF THE SCROTUM.

Dr. Alexander Randall, of Philadelphia,[1] records 16 examples of this condition, first described by Fournier in 1883, which have occurred in the Philadelphia General Hospital since 1904. The three cardinal features of the disease are the explosive onset in the midst of apparent health, the rapid evolution of mortification, and the total absence of the usual causes of mortification. Five of the cases ended fatally, a mortality of 31·2 per cent., death being due to profound toxæmia. In six of the patients a penile swelling and gangrene preceded or accompanied the scrotal lesion. In the present series only the structures of the skin and subcutaneous tissues were involved. Owing to the mode of onset, the progressive spread, the tissues involved, and the rarity of implication of the deeper structures the morbid process may be regarded as a lymphangitis. There appear to be two types of infection, one producing gas and the other not. In 7 of the 16 cases emphysematous crepitation in the tissues was felt, and in several of these escape of gas was audible on incision. The *Bacillus aerogenes capsulatus* was cultivated in one case. In the non-gas-producing cases the most frequent infecting organism was a streptococcus. Six of the cases had local lesions which may have acted as portals of entry for the virulent organism—e.g., phimosis in one case, recent chancroidal infection in two cases, urethritis in one case, an indefinite history of trauma in one case, and hæmorrhoids in one case. In all the remaining cases the patients appeared to be in their usual good health. Treatment consisted in early incision and drainage, and the application of a copious dressing of gauze saturated with a 1 in 3000 solution of potassium permanganate.

[1] Journal of Urology, June, 1920.

WELFARE OF THE BLIND.

THE second annual report (H.M. Stationery Office. Price 6*d*.) of the Advisory Committee marks a further stage in public interest for the welfare of the blind. The chief proposal made in their first report was that grants in aid should be made to approved agencies for the blind in respect of particular services carried on on behalf of the blind. This proposal having been adopted by the Ministry of Health, subject to certain necessary conditions, the committee now report with satisfaction that the recommendations made by the Ministry have in almost every case been substantially carried out. Administration has in all cases been overhauled and tightened up and a fresh impulse been given to all work on behalf of the blind. The only exception to this satisfactory state of things is that there is still considerable want of coördination between different agencies in certain parts of the country on account of what they consider their conflicting interests. This applies especially to the South Wales area and to London. In the latter area the two largest workshops have thought fit to abstain from making any application for grant to the Ministry, apparently in order to escape from having to comply with their regulations as to coöperation. On the other hand, the Committee state that they have succeeded in establishing the closest coöperation between themselves, the Ministry, and the National Institute for the Blind. This last organisation has agreed to the suggestion made to it that it should supplement the grant to the county associations paid by the Ministry; in fact, grants have been made equal to half that of the Ministry. The report further reminds us that some 46 per cent. of the blind are for one reason or another unemployable. The needs of this class are the main concern of the Blind Persons Bill at present before Parliament, one of whose provisions will give the Old Age Pension to all blind people over the age of 50, and another will empower county and county borough councils to themselves expend money for promoting the welfare of the blind, the Ministry being prepared to make a grant of 50 per cent. of the approved capital outlay so expended. All this will be welcome news to the blind. Perhaps even more important to the community at large is the announcement that we were able to make last week that the Ministry of Health have appointed a committee to report on the causes of blindness and to suggest measures which might be taken for its prevention. This committee is preponderatingly medical and includes three ophthalmic surgeons. To them the causes of blindness are already well known. As to its prevention the avoidance of future wars is too big a subject, but precautions against industrial accidents will doubtless be one subject to be considered. Another should be the better education of the general practitioner, so that early cases of glaucoma should no longer have to wait for efficient treatment until too late. By far the most common form of blindness, however, is gonorrhœa, and the supreme task of the

committee will be to recommend what further measures are possible to ensure in the first place the prevention, and in the second the immediate treatment, of ophthalmia in the newborn.

PERIODONTAL DISEASE IN ANIMALS.

THE fatal case of pyorrhœa alveolaris in a woman 24 years of age, recorded by Mr. R. Eccles Smith in THE LANCET of Sept. 11th (p. 555), has led Mr. F. T. Harvey, F.R.C.V.S., of St. Columb, Cornwall, to point out that cellulitis, arising from an affected alveolus, is rather frequent in colts. An alveolus may be diseased as early as the sixth month of life and may pass unobserved for some time until secondary infection arises. Alveolar disease may kill outright or lower vitality to such an extent as to predispose the colt to general disease and parasitism. Caries as an accompaniment of disease of the alveoli is very rare. The crown of the tooth is seldom diseased, but the sides of the tooth-socket and the gums become inflamed and offer portals for the entrance of infective micro-organisms. Acute cellulitis of the head has long been recognised in horses, and Mr. Harvey is of opinion that at least 1000 horses and colts die every year in Great Britain from this condition, with periodontal disease as its point of origin. The reason for the foal becoming infected is injury to the mucous membrane from premature mastication of hard food. Milk and soft grass are the natural diet of the foal, while chaff, especially in its harder varieties, should not be given at all during the first two years of its life. In cattle the infecting agent is generally the ray fungus. Mr. Harvey's communication, which was read before the Central Veterinary Society, is the record of close observation over a period of years.

"MOORFIELDS" AS AN INTERNATIONAL INSTITUTION.

THE Royal London Ophthalmic Hospital has based a recently-issued appeal for support on the historical relations of the institution with the Indian Empire, the Dominion of Canada, and the United States of America. We presume our readers' familiarity with the objects for which a fund of £100,000 is to be raised. These are briefly (1) to enable the hospital to extend its laboratory accommodation for purposes of clinical and pathological research; (2) to supply adequately paid assistants to the honorary medical staff, in order to liberate the latter from much of their routine work, and allow them to devote more time to clinical instruction and research; (3) to supply adequate accommodation for the nursing staff, both those who carry on the hospital work and those desirous of training in the nursing of eye diseases. Emphasis is laid upon the necessity for the training not only of ophthalmologists but also of ophthalmic nurses, for whom the hospital aims at making special provision. The appeal to India includes details of a connexion established in 1819 with the East India Company, whose directors were so impressed with the prevalence of eye diseases in the countries over which they ruled that they determined upon the establishment of a hospital. Surgeon R. Richardson, who had studied under Benjamin Travers at the Moorfields Hospital, became the founder and first superintendent of the Madras Eye Infirmary, now known as the Government Ophthalmic Hospital. In 1824 two other surgeons, both former students of the Moorfields Hospital, were sent by the Company to found eye hospitals in Bombay and Calcutta. Very many Indian medical men and women have received their training at the same institution; the supply of women doctors is particularly valuable to India, on account of the large numbers of women precluded from receiving assistance from men. The appeal to Canada is pointed with a list of leading Canadian ophthalmologists who have held appointments on the Moorfields Hospital staff. In the leaflet addressed to America mention is made of the fact that the hospital, which has now been established 116 years, is the parent of all similar institutions in the English-speaking world. In 1811 two young Americans, Dr. E. Delafield and Dr. J. Kearney Rodgers, came to study there, and on their return to their own country founded the New York Eye and Ear Infirmary. The Massachusetts Charitable Eye and Ear Infirmary owed its foundation to a similar period of study spent at Moorfields Hospital by Dr. Edward Reynolds, who came from Boston to London in 1816. Since the time of these pioneers of American ophthalmology there has been a continuous succession of American medical men working in the departments of the hospital.

VACCINATION IN THE TROPICS.

THE Tropical Diseases Bureau has published a 64-page pamphlet entitled "Vaccination in the Tropics," by Colonel W. G. King, I.M.S., ret., which will be read with interest and profit particularly by those concerned with the prevention of small-pox in our tropical possessions. The first of the two sections of this pamphlet deals with small-pox incidence and the problem of protection of population. The variation in type of the disease, its different strains, and the existence of mild forms are recognised in widely separated regions of both hemispheres; at times a variation is found side by side with the ordinary type. The introduction of the disease among peoples unprotected by former attacks or by vaccination is described as responsible for the extermination of whole tribes and races; examples are quoted showing the enormous cost of such epidemics, and instances given of the increase in the virulence of the latter consequent upon war, poor feeding, and unhygienic conditions. Examples quoted of the enormous cost of sickness from small-pox among unprotected Indian natives convey an idea of the urgent necessity for measures of prevention.

Dealing with protection of populations by inoculation or vaccination, Colonel King traces the history of the former to Chinese and Indian methods in vogue long before the eighteenth century, and based on observations made at the dawn of the Christian era—methods which aimed at inducing attacks of the mild type of the disease, in order to secure immunity from the more virulent form. From such drastic forms of prophylaxis he passes to the ideal protection secured as the result of Jenner's famous experiments in 1798, and the real advantages of vaccination, which world-wide experience has shown to be the essential of prevention. Too much emphasis cannot be laid upon "efficient vaccination," including revaccination at puberty. There follows a complete and detailed account of the "vaccinator's outfit," with a note on the transport of vaccine in tropical countries. The writer deals fully with details of technique and the practice of asepsis. The form of scarifying instrument, the cleansing of the site of vaccination, the operation itself, the development of vaccine vesicles, the type of successful vaccination to be aimed at, and the after-treatment and sequelæ are graphically described. The liability of native races to certain skin eruptions during the hot season is mentioned, and a word of caution is given to avoid hastily attributing their occurrence in the course of vaccination to impurity of the vaccine employed.

Section 2 is devoted to animal vaccine and to the organisation and supervision of vaccine institutes necessary for satisfactory cultivation. In the selection of a suitable site for the buildings of such an institute the requisite essentials are an environment of moderate and equable temperature, a plentiful supply of potable water for staff and animals, and the ready provision of fresh fodder for the calves utilised for vaccine cultivation. The proximity of an institute to bacteriological and biochemical laboratories is rightly considered desirable. For practical purposes the inclusion in the pamphlet of particulars as to the estimated cost of the building and upkeep of such an institute and as to the area of country it might serve, would have been welcomed. The necessary buildings are mentioned in detail, as including space for examination, quarantine, and observation of animals, their cleansing, disinfection and treatment; washing sheds, inoculation sheds, operation room, vaccine preparation room, and rooms for cold storage and sterilisation of clothing, and all articles connected with inoculation; and accommoda-

tion for resident and non-resident staffs, whose numbers and duties are set forth. In the choice of animals close attention to their general condition is essential; the selection of calves of good physique which have been weaned and are possessed of a soft, supple, unpigmented skin of the abdomen is important for their fitness as vaccinifers. A separation is made into those fit for "vaccine stock" and those suitable for yielding vaccine for issue from the institute. The preparation of calves for inoculation is fully described, as is also the technique and detail of the cultivation of animal vaccine. A description is given of the operation room and its equipment, and of the operation itself. After inoculation the adjustment of a calf collar is necessary to prevent the animal from licking the abdomen; it is then removed to a place in the shade for close on an hour, when a calf apron is fitted over the abdomen. Details of after-care follow. The various stages in the development of the vesicles following calf-inoculation are described and admirably illustrated by colour drawings of their appearance at the 72nd and 120th hours. Full directions are given as to the collection of vaccine when complete vesiculation is established—i.e., about the 120th hour, and while the lymph is still clear—together with a description of the precautions necessary to avoid contamination and the admixture of blood. The difficulties arising from degeneration of vaccine stock, and efforts at revival are dealt with under the section entitled "Rejuvenation," embracing a historical retrospect of previous attempts by well-known authorities and an account of the various animals employed as rejuvenators. The purity of vaccine, the choice of preservatives, and their action not only on the extraneous organisms, but on the potency of the vaccine itself, receive the fullest attention. An account is given of the results of various bacteriological investigations, which bear on the varieties of organisms present and the bactericidal effect of the preservative employed.

This valuable contribution to the prevention of small-pox in the tropics closes with a review of the duration of potency of vaccine, in which the writer claims that the weight of evidence and his own experience favour the use of lanolised vaccine in preference to either the desiccated or glycerised preparations, or arm-to-arm vaccination. In support of this opinion he quotes the success rates per cent. as found from the use of different forms of vaccine in Uganda in 1916: Desiccated vaccine (Lister Institute, London), 66 per cent.; lanolised vaccine (Lister Institute, London), 91·32 per cent.; glycerised vaccine (Nairobi), 67·32 per cent.; arm-to-arm, 78·09 per cent. As an appendix to the pamphlet, an account is given of Noguchi's method of purification of vaccine which bids fair to secure the ideal aimed at—namely, a vaccine free from extraneous organisms and capable of increase of potency—the method is detailed by extracts from Noguchi's original paper (*Journal of Experimental Medicine*, 1915, xxi., 539) on Pure Cultivation In Vivo of Vaccine Virus Free from Bacteria.

VOLUNTARY ACCELERATION OF THE PULSE.

CASES of voluntary acceleration of the pulse are so rare that they have always attracted attention. In the *Johns Hopkins Hospital Bulletin* for September Dr. John T. King, jun., has reported the following case:—

A man, aged 26 years, was in good health, though he had been subject to naso-pharyngeal infections with lymphatic hypertrophy and glandular enlargement. He was "highly strung" and excelled in games which required speed and quick muscular control. For many years he had been subject to attacks of uncontrollable thumping of the heart and tachycardia when under emotion. During the war he made three attempts to enlist, but was refused on account of his heart. He came under Dr. King's observation at a medical advisory board. Examination showed a normal heart, with marked tachycardia and cardio-respiratory murmurs. As the tachycardia was apparently due to excitement he was accepted. He went through training without trouble and saw active service during the Argonne Forest drive. After the armistice he reported for a minor complaint, and effort syndrome was diagnosed. In October, 1919, he consulted Dr. King because this diagnosis made him uneasy. Examination showed that he was organically sound. The reflexes were slightly exaggerated. He could voluntarily move his ears and posterior scalp muscles. During examination there was a marked tachycardia and sinus arrhythmia. He said that he could accelerate his pulse "by thinking about it." This was readily verified. Almost immediately on command a rise in rate set in sharply. The pupils dilated slightly and the respirations became somewhat irregular and seemed a little shallower. He stated that he created no emotional state and that the rise was due to calm voluntary effort. He was conscious of his heart beat when accelerated and knew without feeling his pulse whether his efforts were successful. The rise varied from 20 to 40 beats per minute. He could also retard the accelerated beat, but could not reduce it below the initial rate. Electrocardiographic tracings showed that the mechanism of the heart beat was normal throughout. The following is an example. At rest the R-R interval measured 0·72 second (rate 83); following signal to accelerate it shortened to 0·6 (rate 100), and then to 0·56 (rate 107). Following the signal to slow it dropped back to the initial rate. In another test the effort to accelerate was made while the breath was held in inspiration. On inspiration the pulse was retarded by 18 beats per minute. On effort, with the breath held, the acceleration amounted to 37 per minute and the retardation to 27. Thus the acceleration was greater while the breath was held than under usual conditions. On expiration there was sinus arrhythmia.

Any explanation of the phenomenon must be hypothetical. The sinus arrhythmia, the acceleration when the breath was held, a history of sensitiveness to belladonna, and a statement of the patient that the respiration was in some way involved in the process of acceleration, suggested that the acceleration was due to unstable vagus control, allowing accelerator influences to gain control. It is known that vagus arrhythmia is due to rhythmical changes in vagus activity during respiration. H. F. West and W. F. Savage have recently[1] described the fifteenth case of recorded voluntary acceleration of the heart. It much resembles the present case. The subject was a young man whose heart was normal on ordinary as well as electrocardiographic examination. During the acceleration the pupils dilated and the blood pressure rose. On injection of 0·002 g. of atropine the pulse-rate increased by 25. West and Savage attributed the acceleration to decrease in vagus inhibition, probably augmented at times by accelerator influences.

THE LONDON MEDICAL EXHIBITION.

THE clear success, which it proved to be, of the London Medical Exhibition this year, the tenth of its kind, must have been gratifying to its organisers. It was held in the Central Hall, Westminster, and was opened on Monday last and was continued until the following Friday. The exhibition drew a large number of visitors, and members of the medical profession gave decided evidence that they found it interesting and instructive. There was, for example, a profusion of new surgical instruments shown, and an important feature of the presentations was the British-produced drugs, including the medicinal synthetics, colloids, antiseptics, and electrical apparatus. The whole formed a comprehensive collection of materials illustrating not only the fresh aids offered to the physician and surgeon in the course of their practice, but also the success with which home-made surgical and medical appliances are being produced. There was excellence of workmanship shown and the display of fine drugs was attractively arranged. Exhibitors vied with each other to make their stalls artistic, and it is remarkable what opportunities the various forms of medicaments afford to make a picturesque tout ensemble. Beautiful specimens of crystals were bountifully displayed, and the pharmaceutical products generally revealed an elegance of great credit to the craft. We propose to give a review of the more important exhibits in a future issue.

[1] Arch. of Int. Med., 1918.

THE MEDICAL DEFENCE UNION, LTD.—At the meeting of the elected members of council on Sept. 30th, Sir Charles Ballance was unanimously elected President of the Union, vice Sir John Tweedy, resigned.

HYGIENE ON THE SEA:

ACCOMMODATION FOR SEAMEN IN SHIPS OF TO-DAY.[1]

(BY OUR SPECIAL CORRESPONDENT.)

III. THE "IMPERATOR."

I WENT on board *Imperator* with great expectations. Years ago the German lines in China had better ships than the English; German ships were reported recently to be more comfortable than the English on the East African and South American lines; Germans, too, were proverbially scientific; what improvements in comfort, what novel devices to increase health might one not find in *Imperator*, built as she was to challenge English superiority on the Western Ocean. During my visit I was frankly disappointed. She is not so well fitted as *Aquitania* or *Olympic*, and I found her in no way superior to them, except of course, in size. She is very useful just now, for she will carry 3400 passengers, in addition to her crew of 1160, and passages are much needed.

Dimensions and Fittings.

The Cunard Company, as THE LANCET had a permit from the Ministry of Shipping, were good enough to send me on board to the care of the medical officer, who had just joined and was very busy, but introduced me to the dispenser, formerly a chief sick-berth steward in the Navy, who kindly took me round. The ship is enormous; I was most struck by the great ballroom, 25 ft. high, handsomely upholstered in vieux-rose, and decorated with splendid tapestry panels. It is of a size to remind the seafaring man of the lounge in the Adelphi Hotel at Liverpool. That the carpet in the centre may be rolled up to uncover a dancing-floor witnesses to the great stability of the ship. Outside this saloon is a palm-court lounge, and there are private dining-rooms beyond. The first-class cabins are scarcely so well fitted as in the English ships; only the most expensive cabins had hot as well as cold water laid on; there were both electric fans and radiators. For the second- and third-class accommodation there was the usual equipment, which requires no detailed description.

Ventilation.

The ventilation of the ship is both supply and exhaust, but could not be judged as the fans were not running. Probably the pressure at which air is supplied is higher in this ship, as there are more opportunities in the cabins for grading its supply, and the trunks everywhere seem smaller. The third funnel is said to be for ventilation, but in fact it only takes air from the engine-room. The fans are mostly German, the others are "Sirocco" fans, and, I was told, are more effective than the German patterns. The Sirocco fan, made in Belfast, may be said to be the universal fan afloat to-day for ventilating ships and boiler-rooms.

Stewards' and Firemen's Quarters.

Accommodation for the stewards is much as in the other ships. Their dormitories are still traditionally termed "glory holes," though they are far from suggesting overcrowding and discomfort. Each berths some 24 men with good beds and sufficient space. Their lavatories are good, white fireclay basins, cold water-supply all over, and there are baths, also laundry troughs for washing clothes. Their latrines are trough closets, with self-flushing cistern, but no latrine paper or latrine paper boxes: the pages of newspapers were lying about. I missed the seamen's accommodation, but found where the firemen live. This ship burns coal and has an engine-room staff of 490 in all. The numerous firemen live in small, dark cabins—dark, I say, because of the economy of electric light that obtained; that may be different when the ship is running. Their beds were the straw palliasses spoken of in other ships. The first need for these men's comfort is an anteroom to the engine-room, a cloak room, with baths and lockers for their working suits. These must at present be taken into their sleeping places, which are thus made very dirty, then, as the men have got so far, they may, if careless or tired, remain in these suits until they go on watch again, so that their messes get no chance to be clean. The passages here were but dimly lighted, their walls coal-smeared and dark, and one was sorry for men who had to live and work under such conditions. The ship does not belong to the Cunard Company; perhaps things will improve if the company should take her over.

Devices on the Bridge.

On the bridge is a notable fire indicator, a glass case in which one sees some two dozen trumpets, suggesting a musical-box. Each is the upper end of a tube coming from a different compartment of the ship below. In the case is an exhaust fan drawing air up these tubes. In normal times there is nothing to see, but should fire occur anywhere smoke from that compartment would come out of its trumpet, the officer of the watch would open the case, remove the trumpet, attach to its tube the steam hose which is always ready alongside, and blow steam into the compartment, smothering the fire at once, before even the fire brigade could get to it. All over the ship besides there are automatic alarms, and in some places sprinklers, put in action as soon as the temperature rises above what is safe. These ships are so enormous that their fire protection must be, and is, very well developed.

On the bridge, too, the chief officer was good enough to show me the gyro-compass. The master compass is amidships, over the boilers. It is a heavy wheel, driven by electricity at a very high speed. Being so heavy, moving so fast, and able to take its own chosen position, it establishes its axis in a definite relation to the polar axis of the earth, and so gives the absolute direction of the north pole, under the influence of gravity only without any relation to magnetism, and thus it points always to the true north wherever the ship may be heading. By electricity this direction is communicated to four other compasses—three on the bridge, one on the upper bridge—and by these the ship is steered. The compass card has in its centre a small circle divided into ten degrees, each with an angular deviation of 36 degrees on the large card. As the ship is turned completely round the main card appears to go round once, but the inner card 36 times. In consequence the degree is greatly magnified to the helmsman or quartermaster, and it is possible nowadays in these great ships to steer to a course within half a degree. Such fine steering, which shortens passages, would have been impossible years ago; shorter ships with less inertia were more easily deflected from their courses, when hand-wheels had less directional power. It would also have been useless since magnetic variation made the courses less certain.

Hospital Equipment.

Imperator has two doctors, two dispensers, and 20 stewards and others to help in looking after the 56 hospital beds, of which 14 (8 males, 6 females) are for infectious cases, 20 (as good as the others) for the crew. The matron is a trained nurse and is helped by stewardesses as required. There is an operating theatre and a dispensary, in equipment just a little behind the ordinary establishment of the largest English liners.

A Welfare Superintendent Needed.

I would venture to add that there is great need in these shipping companies for an official, an assistant marine superintendent, to concern himself with the condition of the accommodation of the crews as a welfare superintendent. The men sign on for a single voyage and go. That a great many wait for the ship's next voyage and sign on for her again and again is true, but theirs is not continuous service, and there is need for someone who shall consider continuously their interests and that of all men who serve in all the company's ships, and who shall recommend to the companies such improvements in conditions as are from time to time necessary. Men going to sea

[1] Previous articles describing the accommodation on the *Aquitania* and the *Olympic* appeared in THE LANCET of Sept. 11th (p. 569) and 25th (p. 666), respectively.

should not in their lodging and general comfort be constrained to accept a lower grade of comfort than is customary to men of their position in work ashore, except in so far as is necessarily incidental to life at sea. The crew are of necessity separated from the wives who keep their houses ashore clean for them to return to from their ordinary employments. That cleanliness and comfort at least could be given them at sea, and it is for the companies to see that they get it. The large shipping company which first devotes its attention successfully to securing comfort for its men is likely to be able to select for its crews the best of the seafaring men, will so have more careful men to take care of its equipment and stores, and will probably earn the sympathy and support of its crews, and that will mean much to its dividends. Such a reform must be patiently introduced, as it will take a little time for seamen to realise that a new consideration for them has awakened in the minds of the management. That conditions at sea are hard on the men must be in the minds of readers of THE LANCET, who will recall the statement of the discomforts of the sleeping decks of merchant ships which THE LANCET quoted from Rear-Admiral Boyle Somerville's article in *Blackwood's Magazine* for February, 1920, in which was described the surprised horror with which, during the war, these discomforts burst on an experienced naval officer who had suddenly to do duty in a merchant ship.

In conclusion, grateful thanks are due to the Ministry of Shipping and to the Cunard Company who permitted and made easy the visit of your representative to the gigantic *Imperator*.

SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

Care of the Blind.

THE provisions of the Blind Persons Act, which came into operation last month, are dealt with in a memorandum issued by the Scottish Board of Health to county and town councils. It is pointed out that the care of blind persons has hitherto been undertaken by voluntary agencies, and that the assistance rendered has depended upon the funds which they were able to collect. As private subscriptions were insufficient the Government has come to their assistance with grants, whose administration is governed by the Board. The Act places upon county and town councils a definite obligation to make arrangements satisfactory to the Board for the welfare of blind persons ordinarily resident in their areas. It is suggested that councils should appoint special committees, and coöpt persons who are experienced in the care of the blind. They should also make use of the knowledge of the approved voluntary agencies. The Act provides that councils may make provision directly themselves or indirectly by contributing to already existing institutions. In most cases the latter method will be found the most suitable, and in this event the councils should make application to obtain representation on the management. As the distribution of blind persons in Scotland is scattered, combined schemes should be formulated to use existing institutions in one of the areas, either under the control of the council in whose area these are situated or under a joint committee. In any event, the contribution made would be allocated among the various parties in the combination. In preparing schemes it is to be borne in mind that the education and training of blind persons are duties specifically imposed upon education authorities.

New Regulations for Admission of Medical Students to Scottish Universities.

A year ago the Scottish Universities Entrance Board decided to raise the standard of the Medical Preliminary Examination. After Jan. 1st, 1921, every medical student must pass the Arts Preliminary Examination, or that recognised for degrees in pure science, or an examination recognised by the Board as their equivalent. The last examination under the old regulations has been held. Students who have passed in all the subjects must apply for the attestation certificate of the Board before Dec. 31st, otherwise these passes may be of no avail.

Small-pox in Scotland.

Throughout the summer small-pox has continued to make its appearance in various parts of Scotland. With the exception of Glasgow, where the disease was first recognised, the cases have been few in number, but the area of incidence has very widely increased. Dumbartonshire, Stirlingshire, Ross-shire, Fifeshire, and other parts have all yielded cases. The Scottish Board of Health has again circularised local authorities regarding the notification of chicken-pox. It is pointed out that about one-third of the local authorities acted on the recommendation of the Board made in April last, but that cases of small-pox have appeared in other areas where the notification of chicken-pox was not adopted. The continued extension of small-pox is due largely to the movement of mild and undetected cases. The Board considers it desirable that chicken-pox should be notifiable in every area. As small-pox may be confused with infections other than chicken-pox, practitioners are requested to seek the coöperation of the medical officer of health in any case of doubtful illness which has even a remote resemblance to small-pox.

Edinburgh Royal Infirmary.

A sum of £15,000 has been given to Edinburgh Royal Infirmary by the Scottish branch of the British Red Cross Society (City of Edinburgh Committee) for the purpose of providing a new electrical department, including radiography, to be permanently associated with the name of the Society.

Conference of Scottish Association of Insurance Committees.

The annual conference of the Scottish Association of Insurance Committees was held in Inverness on Sept. 24th and 25th. Over 100 delegates were present. The subjects discussed included the centralisation of services, the constitution of local health bodies, and unification and extensions of the various organisations dealing with the health of the community. A resolution—

> That the withdrawal of the administration of sanatorium benefit from Insurance Committees is likely to be detrimental to the interests of insured persons

—was discussed at length, and disclosed considerable difference of opinion. The following motion was adopted:—

> That sanatorium benefit should be administered by the Insurance Committees until full provision has been made for treatment by the responsible authority.

Hawick Ambulance.

During the war Mr. Peter Scott, of Norwood, presented a motor ambulance to the Government on condition that, if it came through the war, it was to be presented to Hawick Corporation. The Hawick town clerk stated at a council meeting that the ambulance came through all right, but that information had been given on two occasions that contrary to instructions it had been disposed of by the Disposals Board. The authorities seemed to think that that ended the matter, but it was resolved to make further representations.

Glasgow University Court has appointed Mr. James Gordon Gray, D.Sc., to the Cargill Chair of Applied Physics. Professor Gray has conducted classes in physics in the University for some years, both for students of engineering and of medicine. He is a graduate of Glasgow, and is the second son of Professor Gray, F.R.S.

Oct. 4th.

REDRUTH HOSPITAL.—The Committee of the West Cornwall and Miners' Hospital, Redruth, has decided to modify the building scheme of the institution, and to reduce the expenditure to £8000. The British Red Cross Society has promised £4000, and Sir E. Nichol, M.P., a native of Redruth, has given another £4000. The scheme includes a hostel for the nursing staff, additional beds for medical cases, and the provision of central heating for the new hostel.

Public Health.

ANNUAL REPORTS OF MEDICAL OFFICERS OF HEALTH.

City of Liverpool.

Dr. E. W. Hope's annual report for the year 1919 contains, as usual, much interesting material in relation to the health of the city. The population, estimated to the middle of the year, was 781,948. The number of births during the period under review was 18,694, equal to a rate of 23·9 per 1000 of population. It would appear, therefore, that the abrupt decline in the birth-rate during the years of the war has been checked and that there is a marked tendency towards return to the normal. The total death-rate of the city was 17·0 per 1000 of the estimated population, which is the lowest on record with one single exception. The infantile mortality-rate was 110 per 1000 births; the zymotic death-rate 0·96 per 1000; the death-rate from all forms of tuberculosis, including phthisis, 1·7 per 1000, and the phthisis death-rate 1·4 per 1000.

Considerable interest attaches to the history of zymotic diseases in a large seaport, and Dr. Hope has inserted a number of diagrams which show, on a uniform scale, the annual death-rates for a number of years from the various zymotic diseases. The ten years from 1865 to 1874 were characterised by very high death-rates from infectious diseases. The highest mortality figures recorded for small-pox, typhus, cholera, scarlet fever, and whooping-cough fell within this period. In 1866 the general death-rate rose to 41·7, a figure greatly in excess of any subsequent rate; typhus and cholera were the diseases mainly responsible for the excessive mortality. Of the epidemic diseases prevalent in the past 30 years, influenza is the one that has produced the severest outbreaks. The heaviest incidence occurred in 1918, and the continued prevalence of the disease in the spring of 1919 was reflected by a rise in the general death-rate.

A case of plague occurred in the city on July 11th, 1919, the patient being a master-stevedore and bargeman, who was employed in visiting vessels at the docks. He carried on business in a warehouse in which several dead rodents were found, one of which (a mouse) was reported to be infected with plague. Several importations of plague-infected rats on vessels were recorded in the port during the year, and this human case was coincident with one of these.

Thirteen cases of small-pox occurred in Liverpool during 1919. The majority of these were contacts with actual ship-borne cases and had been under observation. The largest number of consecutive cases occurred in a common lodging-house, and after the fifth case had been removed to hospital there was no further extension of the disease. The close supervision exercised by the Public Health staff in tracing contacts and offering them vaccination succeeded in confining the disease to narrow limits. No fewer than 244 immediate contents were vaccinated by the assistant medical officers during the year.

Sixty-four cases of enteric fever, including 2 cases of paratyphoid B, were reported during the year in the city and port, this being the lowest figure as yet recorded; 27 of these cases were brought by shipping, while 6 were infected whilst resident in other parts of Britain, leaving only 34 of indigenous origin. Two persons were infected by the consumption of mussels.

The number of cases of scarlet fever notified during the year amounted to 2797, this being slightly below the average for the past ten years, which was 3032. One-half of the cases occurred during the last four months of the year. The number of deaths was 74, or a mortality-rate of 9·4 per 1000 of the population, and a fatality-rate of 2·6 per cent. of the notified cases. Study of the death-rate from scarlet fever since 1849 shows that during the first 30 years of this period outbreaks of the disease accompanied by severe mortality occurred at intervals of three or four years, culminating in 1874, when 1911 deaths were recorded from the malady, or 375 deaths per 100,000 population. Since that date the disease has declined to its present low figure. In 1889 scarlet fever became notifiable, and modern methods of isolation of the patient, &c., were applied. The case-rate, or proportion of cases per 1000 of population, has declined during the past 30 years from 6·8 to 3·1. More notable still is the decline in the fatality-rate, or proportion of deaths to notified cases, which has fallen from over 16 per cent. to its present figure of 2·6 per cent.

The number of cases of diphtheria notified amounted to 1959, and there were 212 deaths. The number of cases of measles reported during the year was 3983. This is the smallest number since the disease was made notifiable under the Public Health (Measles and German Measles) Regulations, 1915. The number of deaths resulting from the malady was 103, which is the smallest number of deaths in the 72 years since records have been kept. The Public Health (Measles and German Measles) Order was cancelled by the Ministry of Health as from Jan. 1st, 1920. In view of the rising incidence of the disease, however, request was made to the Ministry for the Order to be extended until Oct. 31st, 1920, and this was acceded to. In Dr. Hope's opinion this extension was attended by much benefit to the children suffering from the disease.

During 1916 attention was directed by the Public Health Department at Liverpool to the danger of contracting anthrax resulting from the use of infected shaving brushes. Quite a number of cases of this nature came under observation, and the circumstances associated with each were carefully investigated. A very large number of shaving brushes were submitted to bacteriological examination with a large proportion of positive results. On further investigation of the matter it was found that a consignment of shaving brushes, imported from Japan, had been received in London and distributed to Liverpool and other places. Steps were at once taken to prevent the sale of these brushes, and in view of previous experience in connexion with foreign imported shaving brushes, warning was given to other cities and towns where the brushes had, in all probability, been distributed, and a notice in connexion with the matter was inserted in the local press. Having seen this notice, several retailers submitted shaving brushes for examination and in five instances they were found to be infected with anthrax.

As a result of the Liverpool experience and the occurrence of cases in other parts of the country which owed their infection to the use of shaving brushes, the Anthrax Prevention (Shaving Brushes) Order, 1920, was issued prohibiting the importation into the United Kingdom of shaving brushes manufactured in, or exported from, the Empire of Japan.

County of Durham.

In his annual report for the year 1915, which, owing to conditions resulting from the war, has just been issued, Dr. T. Eustace Hill makes reference to the bad condition of the streets as having a detrimental effect upon health. Throughout the county there are a large number of "unmade-up" streets, and more particularly in the colliery districts. Until comparatively recently it appears to have been a common practice in these districts to build long rows of houses and to leave the streets in an unfinished state. In the winter months these streets are almost impassable, and in dry weather they are equally objectionable, especially where the conservancy method of excrement disposal is in use. A common practice in these districts is to empty the contents of the closets on to the footpath or on to the roadway, and then to shovel it into an open cart. Thus the soil, in course of time, becomes saturated with organic matter. In wet weather the dirt from the streets is trodden into the houses and in dry weather the dust, laden with germs of disease, is distributed broadcast. Not infrequently everything in the house is covered with dust, including the larder and the food, with the result that typhoid fever is endemic in the colliery districts. In the summer there is much sickness, and the children, who are most susceptible, are carried off in large numbers from epidemic diarrhœa.

Dr. Hill also makes some pertinent remarks in reference to the public milk-supply.

He states that the paving, drainage, ventilation, lighting, and water-supply of the dairies and cowsheds in the county are being gradually improved, but very much remains to be done, yet little or no reference is made in the reports of the district medical officers of health to this important question of milk-supply. Radical changes, both in the production and in the method of distribution, are greatly needed, and for this purpose more supervision of the dairies and cowsheds than has hitherto been the case will be required. To obtain a wholesome supply of milk it is essential that the cows should be housed in properly constructed, well-lighted, and ventilated buildings, and that those suffering from tuberculosis should be eliminated from the herd. In this connexion Dr. Hill suggests that dairy farmers should be given an opportunity of having their cows tested free of charge. The regulations which district councils are empowered to make should prescribe the floor and cubic space for each cow, irrespective of whether they are habitually turned out during a portion of each day. There should be an adequate water-supply, both for drinking and for washing down the

cowsheds, and proper washing facilities should be provided for the milkers. Having provided suitable buildings, it is of the utmost importance that the dairy farmers should have some knowledge of the hygiene of milk production, and where this is lacking facilities should be given for their instruction so as to prevent the milk from becoming contaminated before it leaves the farm. To prevent contamination in transit, the churns should be provided with suitable lids which should be sealed, and no mixing of milk should be allowed at railway termini. Railway companies should be required to provide sheds at the stations for churns, where they can be kept out of the sun until the arrival of the train, and in the summer months there should be refrigerator vans.

Before leaving the town dairy the milk should be pasteurised and sent out in sealed bottles. We think this suggestion of Dr. Hill's would require to be carefully considered before being put into universal practice. While much may be said in its favour, the fact remains that the process of pasteurisation requires a considerable degree of skill and much care and attention, and it is doubtful if these qualities are likely to be met with in the average town dairy. Further, if the public know that they are supplied with pasteurised milk, the fact is apt to give rise to a sense of false security. They often believe that such milk can be kept indefinitely without going bad. The reverse is, of course, the case. Ordinary fresh milk, owing to the presence in it of the lactic acid organism, turns sour after a time and this acidity serves to warn the consumer that the milk is no longer fit for use. The lactic acid organisms are killed in the process of pasteurisation, and pasteurised milk affords an excellent medium for the growth of all manner of micro-organisms, which flourish unchecked by the presence of lactic acid. Old pasteurised milk may therefore be a greater danger to the consumer than ordinary milk, and the absence of acidity is apt to be regarded by the uninitiated as proof that the milk is still quite fit for use. Dr. Hill states that, taking the degree of contamination as 100, it has been found after exhaustive inquiry that about 40 per cent. of the contamination occurs at the farm, about 20 per cent. during transit on the railway, and about the same proportion at the town dairies and at the consumer's house. Consumers should, therefore, take every precaution to safeguard the milk from contamination after delivery. In Dr. Hill's opinion it is not improbable that milk in this country will, in the near future, be graded as is done in the United States.

URBAN VITAL STATISTICS.

(Week ended Oct. 2nd, 1920.)

English and Welsh Towns.—In the 96 English and Welsh towns, with an aggregate civil population estimated at nearly 18 million persons, the annual rate of mortality, which had been 10·3, 10·2, and 10·7 in the three preceding weeks, further rose to 11·0 per 1000. In London, with a population of nearly 4½ million persons, the annual death-rate was 10·3, or 0·4 per 1000 above that recorded in the previous week, while among the remaining towns the rates ranged from 4·2 in Acton, 5·4 in Enfield and in Cambridge, and 5·5 in Tottenham, to 16·7 in Dewsbury and in Merthyr Tydfil, 18·3 in Aberdare, and 20·2 in Barnsley. The principal epidemic diseases caused 316 deaths, which corresponded to an annual rate of 0·9 per 1000, and comprised 208 from infantile diarrhœa, 52 from diphtheria, 21 each from scarlet fever and whooping-cough, and 7 each from enteric fever and measles. The deaths from diarrhœa, which had been 171, 182, and 205 in the three preceding weeks, slightly rose to 208, and included 33 in London, 17 in Sheffield, 13 in Liverpool, 11 in Hull, and 9 in Rhondda. There were 3717 cases of scarlet fever and 1778 of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital, against 3305 and 1700 respectively at the end of the previous week. The causes of 22 of the 3740 deaths in the 96 towns were uncertified, of which 4 were registered in Blackpool and 3 each in Birmingham and Manchester.

Scottish Towns.—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2½ million persons, the annual rate of mortality, which had increased from 9·8 to 12·4 in the four preceding weeks, declined to 12·1 per 1000. The 267 deaths in Glasgow corresponded to an annual rate of 12·5 per 1000, and included 10 from infantile diarrhœa, 7 from diphtheria, 2 each from small-pox and measles, and 1 each from scarlet fever and whooping-cough. The 72 deaths in Edinburgh were equal to a rate of 11·0 per 1000, and included 3 fatal cases of infantile diarrhœa.

Irish Towns.—The 139 deaths in Dublin corresponded to an annual rate of 17·5, or 1·8 per 1000 above that recorded in the previous week, and included 16 from infantile diarrhœa and 1 from whooping-cough. The 103 deaths in Belfast were equal to a rate of 13·0 per 1000, and included 5 from infantile diarrhœa and 1 from scarlet fever.

Correspondence.

"Audi alteram partem."

THE LOCAL MEDICAL COMMITTEE OF THE COUNTY OF LONDON AND PANEL PRACTICE.

To the Editor of THE LANCET.

SIR,—I am writing to draw the attention of your readers to a recent decision of the Local Medical Committee of the County of London that "the removal of hæmorrhoids is not within the ordinary competence and skill of a general practitioner." Surely, by these repeated attempts to limit the general practitioner's functions to the prescribing of bottles of medicine we are stultifying ourselves in the eyes of the public and removing all claim we may have had to be regarded by the lay authorities as expert craftsmen. There seems to be a growing tendency among panel doctors to send to hospital every case which presents any features of interest, or calls for the slightest manipulative skill. The particular case which gave rise to this decision of the Local Medical Committee was that of a panel patient of my own, and was brought to the notice of the Panel Committee through my sending in an account for 1 guinea, which is the fee allowed, under the new regulations, for the provision of an anæsthetist. Owing to a condition of thrombosis in one of the hæmorrhoids, the patient was in great pain; and in the present overcrowded condition of the hospitals it certainly would have been difficult to get him immediately admitted, even had one so wished. Moreover, what would to this patient have been a prohibitive expense would have been entailed, since the London Hospital has been compelled to demand a preliminary payment of 2 guineas.

Under the Insurance Act no provision is made for any surgical treatment beyond that which panel doctors care to give. Surely, therefore, in addition to the ignominious position in which the committee's decision places the general practitioner in affirming his incompetence to perform even this minor operation, a great hardship is inflicted on working people. Moreover, though I regard this as the least part of my complaint, panel doctors are required by their terms of service to give to their patients "such treatment as can properly be undertaken by a general practitioner of ordinary professional competence and skill," and for such treatment are "not permitted to receive any fee or other remuneration" from their patients. No definition of what operations come within that competence has been laid down; and, as in the case I have quoted, a doctor is confronted by the dilemma either of leaving his patient to his fate, at the risk of pricks of conscience and censure and possible penalties of the Ministry of Health, or of doing his duty and providing an anæsthetist at his own expense.

Closely related to the principles involved in this decision of the Local Medical Committee is the attitude of the Panel Committee for the County of London to minor surgical operations in general. I am in partnership with six other practitioners, and between us we have 11,000 persons on our panel. Our attendances on insured patients number about 45,000 a year. Naturally we perform a large number of trivial operations without anæsthetics or with local anæsthesia merely. Our major operations we send to the London Hospital. Between these two classes there are, of coursé, a large number of cases well within our surgical competence, calling for the use of a general anæsthetic. Until this year we performed these operations as part of our panel service, without extra fees. Under the new regulations a fee of 1 guinea is provided for the services of the anæsthetist. Our operations under anæsthetics average about one a week—surely a small number in proportion to the size of our panel. But the Panel Committee will have none of it. And, accordingly, we are summoned to appear before it "to explain the large

number of accounts submitted by us [13 in all] as compared with those submitted by other practitioners." So that, in addition to the time spent on the operations (for each of which I and my partners hope to receive the magnificent sum of 3*s*. 6*d*. apiece), an afternoon will have to be wasted in explaining to the Panel Committee why we have done our duty; and, at the end of it all, we stand a good chance of being, what most workmen would call, defrauded. Needless to say, we shall continue to do what we think best for our patients, whether we are paid the agreed fees or not. But I think you will readily see that the dignity and good repute of the medical profession are involved.

I am, Sir, yours faithfully,

Harford-street, E., Oct. 4th, 1920. HARRY ROBERTS.

HYSTERIA FROM THE POINT OF VIEW OF EPILEPSY.

To the Editor of THE LANCET.

"And truth is this to me, and that to thee."

SIR,—The older pathologists thought hysteria wandering of the womb, and epilepsy the very devil. We have abandoned that conception of hysteria, but without agreeing what conception to have in its room. To me hysteria seems to be rampant egoism of the subconscious self. It is as though the captain's wife had mounted the bridge and taken possession of the steering-wheel, the trouble ending only when he recovers his dignity and sends her below again. While we differ among ourselves as to the pathology we are all agreed as to the definition of the complaint—hysteria is that condition that we expect will yield to antihysterical treatment. Logically absurd though the definition may be, it has life-saving value.

One who lives in an epileptic colony may be struck by a negative phenomenon: the absence there of text-book hysterical fits. A familiar sight in the accident room of a general hospital, the text-book hysterical fit is not seen at a colony. This arouses the suspicion that in people familiar with the sight of epileptic fits hysterical fits take the form of epileptic fits. Numerous cases of series of fits seem to confirm the suspicion.

A young woman after having had for years several epileptic fits a month began to have groups of four or five hundred. Each of the fits in these series resembled the fairly heavy isolated epileptic fits that were usual in her at other times. There was incontinence of urine and of fæces. Accumulation of mucus in the air-passages with cyanosis and difficult breathing made her state appear alarming. But when the patient was told that because of these series it would be necessary to discharge her from the colony—a terrifying threat to most colonists—she immediately replied that she would have no more of them. She had no more series, although the isolated attacks continued to occur.

As the series were banished by treatment that was antihysterical rather than antiepileptic it may be claimed that though the individual fits in the series were epileptic the condition was hysteria.

A girl of 13 had 3231 discrete fits in 17 days, of which fits 2258 occurred in the course of six consecutive days. Each fit had the appearance of a mild major epileptic fit. The eyes and the head were twisted to the left; a tonic stage was followed by a clonic. There was incontinence of urine. There was little cyanosis; there was no special tendency to the formation of bedsores; the axilla temperature, whenever it was tested, was below 100° F. The series ended almost by crisis; one day there were 437 fits, next day 41, the day after there were 3. During the occurrence of the series the patient was fed with peptonised milk and at the end did not appear to have lost weight. On the third day after the cessation of the fits she was up and about and as lively as ever, though instead of talking she somewhat ostentatiously made the sounds of a baby that is still wordless. On the Thursday morning she was warned that unless she was found talking on Saturday morning there would be no pocket-money for her. Normal speech returned to her on the Friday afternoon.

In this case, too, it may be claimed that the fits were epileptic, the state hysteria,

These two patients had long been subject to epilepsy. In the following case there was no history of previous fits.

A youth visited a patient at the colony and while riding back on a bicycle to the railway station began, if his story was true, a series of fits. He was found on the high road having isolated fits and was carried to an auxiliary hospital. He and his bicycle were uninjured when they were found. The medical men who attended the hospital not being at once obtainable, I was asked to see the patient. The fits had the look of fairly heavy major epileptic fits, but I thought the trouble hysteria. When the series ended the patient promptly returned to his normal state. His subsequent history is not known to me, but probably it would be if there had been further fits.

Two brothers, who were said to have started to have fits within a short time of one another, were admitted to the colony. The one who had begun first to have fits still has fits, the other brother was soon well and able to go home to work. His trouble was hysteria.

Probably somewhere in the world every day fits occur that are epileptic in appearance and hysterical in origin. But that is not the conclusion of the whole matter. There seem to be fits of intermediate origin. Theoretically, such intermediate fits can be expected. We call fits of conscious origin malingering, fits of subconscious origin hysteria, and fits of unconscious origin epilepsy. It is held that the conscious joins the subconscious, and the subconscious the unconscious, with spectrum-like indefiniteness. Presumably, then, malingering flows into hysteria and hysteria into epilepsy, and it may be that there are fits that are hybrids of epilepsy and hysteria and fits that are hybrids of hysteria and malingering. Such fits there are, and in their treatment there is room for nice discrimination.

I am, Sir, yours faithfully,

ALAN MCDOUGALL, M.D.,

Director of the David Lewis Epileptic Colony.

Alderley Edge, Oct. 3rd, 1920.

PELLAGRA AMONG THE PRISONERS IN EGYPT.

To the Editor of THE LANCET.

SIR,—In the discussions that have taken place upon pellagra I would suggest that too little attention has been paid to the possibility that the diets were deficient in actual calories as well as particular amino-acids. I was placed in medical charge of the P.O.W. South Labour Camp at Kantara in June, 1918, and shortly after made for my own purposes a calculation of the value of the diet actually supplied, and found it to be approximately 3700 calories. My calculations were admittedly imperfect in that they were based on the figures in such works of reference as I carried with me on service. Thus I had no figure for "camel," and took it as a mean between prime and lean beef. Considering the camels in question had no further military value, the figure obtained was probably optimistic. But the same references showed that in the mess we consumed daily a diet of an average value of 4500 calories, and none there complained he was overfed.

In view of the high rate of sickness (30 per cent per diem) and its evident relation with work the first duty laid on me was that of classifying the fitness of the prisoners for labour. In this respect each man had been in category A 1 three months before. My inspection showed that out of 3500 men 318 were now unfit for any labour whatever and 559 were only fit for light labour. Except in the cases of an old gentleman of 70 and a mentally deficient, under-nutrition was the basis of my classification. Those classified by me as unfit for any labour whatever were "living skeletons." Never before had I seen such an advanced grade of emaciation, nor have I since. When a score of such had been segregated for registration the only pictorial parallel presented to one's mind was that of a famine-stricken population with a relief commissioner in charge. The men classified as fit for light labour only were in the same state of nutrition as one can find here in the out-patient tuberculous or aortic subject.

After classifying the men of a company on this basis I regularly questioned the English N.C.O. supervising the work to see if it agreed with his experience. I found N.C.O.'s classified the men into willing and unwilling workers, and that my classification tended to take men who had been and were willing workers, but whose capacity for work had markedly decreased. After this classification had been completed a month

elapsed during which questions of policy were first considered and then the arrangements made for evacuation. It was decided that "lights" as well as "unfits" should go. In the meantime both classes had been resting and also the worst of the unfits sent to hospital.

Before the evacuation each man was re-examined by me. My first impression during this re-examination was that there had been wholesale substitution consequent on interchange of identity discs. There were no "living skeletons" among them and many were in good condition. Careful inquiry, however, showed they were the same men who at the previous inspection had shown such evident signs of under-nutrition. What, then, had happened? Obviously that these men living on the working diet, but resting, had been receiving an ample supply of nourishment. These under-nourished men were 25 per cent. of the whole, and assuming the diet were *just* adequate to the amount of work done it is possible that some additional factor, such as worm infection, was responsible for their failure. I would submit, however, that minor sickness was a much more important factor in permitting a man to escape the full consequences of working on an inadequate diet than in acting as the additional weight weighing down the man working on a just adequate diet.

Eye diseases were very prevalent, 5 per cent. to 10 per cent. being normally sick therefrom. The sufferers were isolated and *ipso facto* rested. Their week or fortnight of isolation thus gave them an opportunity to recuperate. The men who reported sick with the minor complaints worthy of M. and D. —and there were hundreds daily—lost thereby one half-day's work but not their full quantity of food. Those who were awarded light duty or excused duty were obviously even better favoured. And when it is known that a heavy working company produced from 40 per cent. to 50 per cent. of sick per diem it becomes certain that reporting sick was a very real avenue of escape from the full consequences of working on an inadequate diet.

Finally, I would draw attention to the significance of the night-blindness. Dr. Haden Guest, in THE LANCET of Sept. 25th (p. 661), has drawn attention to its present prevalence in Russia and ascribes it to lack of fats. In pre-war Russia there was an annual epidemic associated with the Lenten fast.

I am, Sir, yours faithfully,

Paignton, Oct. 3rd, 1920. W. BURRIDGE.

LOSS OF CELLULAR FUNCTION IN CANCER.

To the Editor of THE LANCET.

SIR,—In your leading article dealing with my paper on the Origin of Cancer, both appearing in THE LANCET of Oct. 2nd, I am credited with the belief that the toxins of the infecting organisms so affect the cell that its function becomes "entirely lost." This is not strictly in accordance with the wording of my article, in which I stated my belief that the function is "impaired." We are not justified in saying that the function of the cell in cancer is entirely lost, for in certain cases of cancer of the thyroid and liver the cell, to a certain degree, is capable of exercising its physiological function.—I am, Sir, yours faithfully,

ALEXANDER PAINE.

Cancer Hospital Research Institute, Brompton, S.W., Oct. 4th, 1920.

ROUTINE CEREBRO-SPINAL FLUID EXAMINATION.

To the Editor of THE LANCET.

SIR,—The article of Dr. A. D. Bigland in your issue of Oct. 2nd will be welcomed by all laboratory workers, in so far as it is a serious contribution to the study of the cerebro-spinal fluid. It is unfortunate that no work in the English language deals adequately with this subject, and the references to it in laboratory manuals are slight and inaccurate. Any article dealing in a general way with the clinical bearing of the results of examination of the cerebro-spinal fluid in chronic nervous disease has, therefore, all the greater weight. For this reason I hope that Dr. Bigland will allow me to criticise his article on one or two points in which, I venture to think, it is misleading. I do this with some diffidence, as, although I have been interested in the cerebro-spinal fluid for more than ten years, and have had the opportunity during the last 15 months of examining the fluids of over 600 cases of subacute or chronic nervous disease, I feel that some differences in results and conclusions may be due to differences of technique.

1. *Cell count.*—Although the classical German authorities recommend the use of a Thoma-Zeiss leucocyte pipette for staining the fluid this method is subject to several disadvantages. In the first place it is essential that special pipettes should be kept for the cerebro-spinal fluid alone, as it is impossible completely to wash out the leucocytes after a blood count, and those that remain are fixed by the alcohol and ether, and often appear subsequently along with the cells of a cerebro-spinal fluid. The same applies to a less degree after the examination of fluids from cases of general paralysis, and other cases in which there is a very high cell count. It is also obvious that when several fluids have to be examined at the same time great delay will be caused unless there is a separate pipette for each fluid, as it is best to allow the fluid to stain for at least half an hour. I have therefore used as a routine 4×½ inch test-tubes in which a measured quantity of cerebro-spinal fluid and stain are mixed and a drop taken out with a clean glass rod. I am surprised that Dr. Bigland pays so little attention to the different kinds of cell found. The presence of polymorphonuclear leucocytes may establish the diagnosis between cerebral abscess and tumour, and also, in my experience, between lethargic encephalitis and polio-encephalitis, in which during the first week of the disease these cells are frequently found. Again, it is not unusual to find in cases of cerebral or spinal tumours, especially of malignant forms, that all the cells are of a type corresponding to the large mono-nuclear found in general paralysis, or even larger than this. When such cells occur in small clumps the diagnosis of tumour can be made with certainty.

2. *Protein content.*—I am glad that Dr. Bigland has not fallen into the common error of considering the Ross-Jones test as an index of the globulin fraction of the fluid. It is obvious that at the line of junction of the fluid with saturated ammonium sulphate a considerable quantity of albumin will be precipitated. I have found the original Nonne-Apelt test (that is, the mixture of equal quantities of cerebro-spinal fluid and saturated solution of ammonium sulphate) satisfactory and simple, and it gives a definite indication of the globulin only. In conjunction with this I consider it essential to make a quantitative estimation of the total proteids, preferably by Mestrezat's method. The comparison of the results obtained by the two methods is of vastly more value than either separately, as all fluids with a definite increase in total protein show some increase in globulin, whereas a disproportionate increase in globulin is only found in syphilitic cases. It is also of far more value to know the definite percentage of proteid in a fluid than to have the opinion of a pathologist that a certain test is + or ++.

3. *Wassermann reaction.*—I do not know why it is a general rule not to heat cerebro-spinal fluids. In my opinion, though it is not always necessary, it is always advisable, especially in highly albuminous fluids. Many of these tend to form a fibrin clot, but may not do so until fibrin ferment is added to them. This happens during the Wassermann test and consequently the fluid may clot in the tube, and by throwing out complement, give rise to what is apparently a positive result. It is also particularly important to heat any fluid which has been kept in the ice-chest for more than 24 hours.

4. *Lange's colloidal gold test.*—According to Cruickshank this test depends on the balance between the globulin and albumin fractions of the cerebro-spinal fluid, and is in no way related to the Wasserman test, nor dependent on antibodies. In my own experience I have found paretic curves in disseminated sclerosis, subacute combined degeneration, paraplegia from Pott's disease, as well as in several cases of tabes. Curves of the luetic type are sometimes given by most forms of chronic nervous disease including epilepsy. I am therefore inclined to agree with the French authorities who consider the test useful in distinguishing general paralysis from other forms of cerebral syphilitic disease, but otherwise as of no clinical value.

5. *Cerebral vascular lesions.*—I have not found that the Wassermann reaction in the fluid is constantly positive in syphilitic cerebral vascular lesions. My experience has led me to agree with Head and Fearnsides that it is the exception rather than the rule to find the reaction in the fluid positive when the disease is confined to the brain.

It is obvious from what has been said that I do not altogether agree with Dr. Bigland's conclusions. In a case of hemiplegia, for example, the presence of a positive Wassermann in the blood is quite sufficient to

establish the nature of the disease, although examination of the cerebro-spinal fluid may help one to determine also its site—e.g., whether cortical or deep. And while I agree that "no case with signs of organic nerve disease should be regarded as not neuro-syphilis merely because his serum Wassermann is negative," it is my experience that the presence of a positive Wassermann reaction in the fluid with a negative reaction in the blood is practically confined to tabes dorsalis.

I am, Sir, yours faithfully,

J. G. GREENFIELD, M.B., M.R.C.P.

The Pathological Laboratory, National Hospital for the Paralysed and Epileptic, Queen-square, London, W.C., Oct. 5th, 1920.

The Services.

ROYAL NAVAL MEDICAL SERVICE: PROMOTION BY MERIT.

IT is announced by the Admiralty that commanders-in-chief and others will, from Nov. 15th next be allowed to include in their recommendations for promotion of medical officers the names of a limited number of officers of outstanding ability whose early promotion is desirable, although such officers may not yet have reached the zone of promotion. This would seem to open up a vista of early promotion by merit rather than seniority, which, if used discriminatively, may encourage some and hearten all officers in the Naval Medical Service.

The following appointments have been notified:—Surgeon Commander: R. L. Jones to *Philomel*, and as Staff Medical Officer to New Zealand Squadron. Surgeon Lieutenant-Commanders: T. C. Patterson to *Chatham*; and R. K. Shaw to *Barham*, on recommissioning. Surgeon Lieutenants: R. P. Nimnis to *Tamar*, additional, for general duties on China Station; and A. G. Taylor to *Queen Elizabeth*.

ARMY MEDICAL SERVICE.

Col. F. Kiddle is placed on half-pay.

ROYAL ARMY MEDICAL CORPS.

Lieut.-Col. R. A. Cunningham retires on retired pay.

The undermentioned relinquish the acting rank of Lieutenant-Colonel: Majors L. A. A. Andrews, T. J. Wright, E. B. Lathbury, E. E. Parkes; Capt. and Bt. Major M. J. Williamson.

The undermentioned relinquish the acting rank of Major:—Capt. and Bt. Major S. W. Kyle; Capt. A. W. Dennis; Temp. Capts. H. L. Tidy, G. Marshall, V. Vesselovsky, H. B. Wilson, C. B. Tudehope.

Captains to be acting Majors:—Bt. Major A. G. J. MacIlwaine and H. R. L'Estrange.

Capt. W. Tyrrell resigns his commission on appointment to the R.A.F.

Temp. Capts. J. H. Fenn and R. D. Nasmyth relinquish their commissions and retain the rank of Captain.

SPECIAL RESERVE OF OFFICERS.

Capt. I. D. Dickson resigns his commission and retains the rank of Captain.

TERRITORIAL FORCE.

Lieut.-Col. A. E. Kidd, from 3rd Highland Field Ambulance, to command 1st Scottish Casualty Clearing Station.

Major G. W. Miller to be Lieutenant-Colonel and to command 3rd Highland Field Ambulance.

Lieut.-Col. H. W. Bruce to be Captain and to relinquish the rank of Lieutenant-Colonel.

Captains to be Majors: E. Knight, A. E. P. McConnell, J. W. Craven, A. H. Pinder.

Capt. E. Osborne to be acting Major whilst specially employed.

Capt. J. J. C. Hamilton is restored to the establishment.

Captains to be Captains: J. Rowland (late Captain, R.A.M.C., Spec. Res.), C. W. Ponder (from 1st London (C. of L.) Sanitary Company), R. S. Morshead (late temp. Captain, R.A.M.C.), A. H. Norris (from T.F. Res.), J. M. Postlethwaite (from T.F. Res.), L. G. Parsons (from 1st Southern General Hospital), J. H. Cobb (from 3rd Northern General Hospital).

2nd Eastern General Hospital: Capt. R. Sanderson having attained the age limit, is retired, and retains the rank of Captain.

Capt. A. E. Huxtable resigns his commission and is granted the rank of Major.

Major G. Ashton resigns his commission and retains his rank with permission to wear the prescribed uniform.

INDIA AND THE INDIAN MEDICAL SERVICE.

Lieut.-Col. de V. Condon is transferred to the temporary non-effective list.

The King has approved the resignation of Lieut.-Col. F. N. Windsor in consequence of ill-health and of Capt. R. M. Easton.

Temp. Capts. J. P. Joseph and M. S. Joshi relinquish their commissions.

Prandhan Ghosh, Sailendra Nath Chandra, Jacob Ezechiel, and Kali Prasad Bagchi are granted the rank of Captain on relinquishing their temporary commissions.

Major D. Heron has proceeded on eight months' leave. Capt. A. S. Fry has been posted Medical Officer, Sisbai Consulate. Major A. H. Proctor, D.S.O., has been appointed First Resident Surgeon, Presidency General Hospital, Calcutta. Capt. W. O. Walker, I.M.S., has been appointed substantively to be Resident Medical Officer, Medical College Hospital, Calcutta.

Obituary.

DAVID LLOYD ROBERTS, M.R.C.S. ENG., M.D. ST. AND., F.R.C.P. LOND., F.R.S. EDIN.,

CONSULTING OBSTETRIC PHYSICIAN, MANCHESTER ROYAL INFIRMARY; PHYSICIAN, ST. MARY'S HOSPITAL, MANCHESTER, ETC.

WE regret to announce the death of Dr. David Lloyd Roberts which occurred on Sept. 27th at his residence, Broughton Park, Manchester. Born in 1835, in Stockport, the son of Robert Roberts, in humble circumstances, at an early age he served in a chemist's shop and later improved his general education at school near Ripponden in Yorkshire. What ultimately became the Manchester Medical School was then young and was situated in Pine-street, near the site of the old Royal Infirmary. Lloyd Roberts entered as a student there and at the Royal Infirmary; he also studied for a short time in London, and in 1857 took the M.R.C.S. and L.S.A. diplomas, and set up in general practice in Manchester. In 1858 he was appointed one of the regular surgeons in ordinary to St. Mary's Hospitals for Women and Children, with which he remained in intimate relation all his professional life. After ten years he was elected honorary physician to the hospital, rendering continuous and efficient service to the institution. In 1878 he was elected to the Fellowship of the Royal College of Physicians of London, and in 1885 he was appointed honorary gynæcological surgeon to the Royal Infirmary, a post which he held for ten years, retiring from the active work of this institution in 1895, having reached the age-limit of 60. He, however, continued his active work at St. Mary's long after this period. Dr. Roberts was also for a time lecturer on clinical obstetrics and gynæcology in the University of Manchester, and was a member of many medical societies. By his medical publications and other literary and practical work his fame extended beyond Manchester, and for many years he was known widely as a skilful, busy, and successful practitioner, an adept gynæcologist, and a good operator, so that by an extensive and lucrative practice he amassed a considerable fortune. He contributed many communications to medical journals, several of them short and to the point and mostly of clinical interest. As early as 1876 he published the "Student's Guide to the Practice of Midwifery," which had a very considerable vogue amongst students of that period, a third edition being published in 1884. In 1898 he showed his knowledge in fields where interest had already taken him. In this year he published a revised edition of the "Religio Medici" and other essays by Sir Thomas Browne, dedicating it to one among his many clerical friends, Canon Lord Normanby. In this edition of the "Religio Medici" is included a short posthumous tract, of six pages, on "Dreams," published originally by Wilkin from the Sloane MSS. in the British Museum. In this quaint tract Browne remarks that "Half our days we pass in the shadow of the earth; and the brother of death exacteth a third part of our lives." In 1914 he published a short pamphlet, read before the Dante Society of Manchester, on "The Scientific Knowledge of Dante." He was a great collector of art treasures, including a specially fine collection of mezzotints, water-colours, glass, and books, and many of the latter were very rare and costly. He presented a large number of valuable medical works to the Royal College of Physicians of London. In the Welsh University and its colleges, more especially that of Bangor, he took a deep interest and was a generous donor.

As an old and intimate friend, Dr. W. E. Fothergill writes thus concerning Roberts's interesting personality:

Any Manchester man could fill a book with tales, true and untrue, that have been told about Lloyd Roberts, and if he had died in his zenith, thirty years ago, his biography would have had a large sale. Hospital work done, he was to be found by mid-day standing—always standing—compact, alert, close-cropped, by his consulting-room fire. There was a glass of milk warming in the fender, and amongst the instruments on the mantelpiece there were walnuts, which he cracked at intervals with explosive violence. These served for lunch. Then there was the

bowl in which all the filthy lucre he received must be washed before he would put it in his pocket, en route for the bank. Lloyd, as he was universally known (pronounced "Lide"), never appeared to belong to any particular age or generation. He used to say that he was not a consultant but "a general specialist, with a leaning towards women," and his definition of gynæcology as "anything either curable or lucrative" has become a classic. A born healer, it did people good merely to see him; he could not only help those who were ill, but he could cure those who were well—a much more difficult matter—and that without any of the modern devices of suggestive therapeutics.

At the monthly meetings of the North of England Gynæcological Society, Lloyd was more than a personality, he was an institution. Mrs. Lloyd Roberts, a dear old lady with white hair and a gentle voice, would see us all off to the meetings. Making sure that her husband had his cape and his skull-cap, she would shake hands with the rest of us, say, "Good-bye, love," to Lloyd, and drive off in the brougham with the dog sitting straight up beside her. The horses were pets also. Lloyd never walked a step and he never took to motoring, but he used to say that if he had not spent a lot on men and horses he would have been in the tomb long since. From the moment the train started he would entertain us with chaff and philosophy all the way to Leeds, Liverpool, or Sheffield. Quite free from illusions, his advice to young friends was sometimes startling. "If you want to be on the staff of a hospital, lad, pretend you're a fool till you're on it!" "There are two ways of getting on: you can be clever or you can be kind; now, *you* can always be kind." "If you can't talk without saying anything, keep your mouth shut." "You can't alter that, so there's no use a-bothering." "Always take off your overcoat in a patient's house. If you are only there a few minutes they will feel you are not in a hurry." He thought a hospital was useful to a man during his first ten years on the staff; during the second ten years honours were about equal; during the third ten years the man was useful to the hospital. At the journey's end on one of these excursions Lloyd would slip in a visit to antique dealers between the station and the place of meeting. Arrived there, he would take steps to ensure an end to the business in good time for the dinner; for he dearly loved the monthly symposium with Keeling, Martin, and Favell, of Sheffield (where Burgess and Snell would also dine with us); the Wallaces, father and son, of Liverpool; Wright, of Leeds; Walter Sinclair, Lea, and Walls, of Manchester, to mention only a few friends we have lost. Though he posed as a gourmet on these occasions, Lloyd was really a camouflaged ascetic whose evening meal at home generally consisted of one course of superlative excellence. In the train on the way back he would often pull out some bit of old silver, china, or glass, or perhaps a couple of additions to his collection of incunabula, which were, he would explain, printed books published before the year 1500. And so home to his house in Broughton Park, where, throughout the age of gas, candles were the only illuminant on account of the pictures, and where the Turners and Prouts were even shaded from the discreet rays of the Manchester sun. Lloyd used to grieve because he could not get anything more into the house without taking something out, so that instead of buying he had to perfect his collections by swapping. There used to be a parrot there which, when asked its age, generally said "Five years" in a husky voice. This bird was almost as old as its master, who was also touchy about his age. One day, some time before the war, he said, apropos of something or other, "Eh, I shall never see eighty." You should have seen him when a lady who was present said, "Don't you mean you'll never see eighty *again*, doctor?" He had a grip like a vice, and while talking he generally kept a firm hold on the lapel of his interlocutor's coat and waved him to and fro like a reed shaken in the wind. Not only his students but his colleagues were always addressed as "Lad" in these conversations. It was the sight of a lifetime to see him cauterise a carcinomatous cervix with a series of small red-hot pokers. The students used to describe his out-patient clinics as one continuous and instructive scream, and they had every opportunity of learning from Lloyd Roberts to be as wise as serpents and as harmless as doves.

Until a month ago Lloyd Roberts drove daily from Broughton to his rooms in St. John-street, Manchester, as he had done for half a century. He always came in an old-fashioned brougham, the horse or horses being good, and many will remember the little figure with the blue serge jacket, top hat jauntily perched on back of head, and plaid rug thrown over the shoulders on cold days, peering from the centre of the back seat that he might miss nothing either on the road to the hospital, the book-shop, two silversmiths' shops, and a chemist's shop—his five regular places of call. He took the chair at the monthly meetings of the medical board of the St. Mary's Hospital until a month ago, and though latterly a little deaf he was quite alert, and there can be no doubt that he enjoyed his life to its close. The distribution of his art treasures, which were well known to many outside Manchester, has been much discussed, the University of Wales, the city of Manchester, and the National Gallery being designated as a possible depository; but it is understood that the city where he practised has not been forgotten in his testament. The funeral took place on Oct. 1st and the representatives of many of the public bodies in which he was interested swelled a large attendance, St. Mary's Hospital, the Royal Infirmary, the Pharmaceutical Association, the North of England Obstetrical and Gynæcological Society, the Art Gallery of Manchester, and the Dante Society were all represented, as well as the Council of Bangor College and the Medical Society of London, of which he was a Vice-President at his decease.

Dr. Roberts married a daughter of Mr. Occleshaw, of Manchester. His wife died in 1910, and he died without issue.

JOHN LEWTAS, C.B.E., M.D. LOND.,

LIEUTENANT-COLONEL, I.M.S. (RETD.).

WE announced last week the death of Colonel John Lewtas, which came as a surprise to many of those associated with him during the later part of his active career in London. Retired from the Indian Medical Service, in which he had acquired much knowledge and experience as a military medical officer on the frontier, and special experience as professor of ophthalmology in the Calcutta Medical College, he offered his services to the War Office at the commencement of war. He was employed on recruiting duties at various stations in London and later on visits of inspection throughout the country. But when the Ministry of National Service was reconstituted he was able to show his special talents. He was one of the War Office Medical Staff transferred to the new Ministry, and for some time was employed in the head office, and afterwards until the close of the Ministry as Commissioner of Medical Services in the Eastern Region.

From the early days of the war Colonel Lewtas took a keen interest in the medical aspects of recruiting, and was at pains to study the methods employed in other countries, especially the medical recruiting problems presenting themselves to our medical colleagues in France. His experience of active military service in India, added to the knowledge acquired by study and observation in England, enabled him to render very special service when the Ministry of National Service had to build up a large medical organisation in a short space of time during the third year of the war. The early medical instructions, especially those dealing with the physical grading of men, owed much of their value to Colonel Lewtas. His sound knowledge of the problems of eyesight and of vision was of particular service here. "His colleagues will recollect with wonder," writes Sir James Galloway, "how he was able, as a relief to a bout of hard work, to turn his attention to the mysteries of higher mathematics, shortly to commence again the routine tasks apparently refreshed and better able to consider a difficult question, quite probably involving political controversy of an anxious sort."

Colonel Lewtas was an example of the best type of military medical officer so frequently given us by the Indian Medical Service. Learned, experienced, wise, and always helpful, his loss is deplored by many of us who looked forward to years of his friendship in London.

RAYMOND VÉREL, M.B., CH.B. EDIN., F.R.C.S. EDIN., O.B.E.

Dr. Raymond Vérel died in a nursing home in Aberdeen in the early hours of Wednesday, Sept. 29th, adding to the long list of young surgeons who have lost their lives through acute infective disease contracted in the course of their professional duties. His illness commenced ten days prior to its fatal termination

with a whitlow, which appeared to give promise of being cured by simple remedies, but acute streptococcal septicæmia supervened, to which he ultimately succumbed.

The intimation of his early death will deeply grieve his many friends, for it was his nature to make friendship wherever he went. A Glen Almond boy, and afterwards a medical student at Edinburgh, where he qualified with honours, he received a training in general surgery, but the influence of Dr. Logan Turner decided him to adopt the career of a specialist in diseases of the ear, nose, and throat, and after further study in Vienna and on the continent he commenced practice in Aberdeen. On the outbreak of war, although a member of the 1st Scottish General Hospital, he applied for and obtained a transfer to the Scottish Horse Mounted Brigade Field Ambulance, and served with it at Suvla on the Gallipoli Peninsula. When here, like many another, he contracted dysentery and was invalided to Alexandria, where at one time his recovery was almost despaired of, but ultimately his health was restored and he was sent home. After a few weeks there, however, he again rejoined his unit, now serving in the Desert of Sinai, and remained with it until after the battle of Romani, when he was transferred to Egypt to practise his own special branch of medicine in the hospitals in Cairo. His duties included the training of selected officers in diseases of the ear, nose, and throat, after which they were posted to hospitals in other places. His work was marked by great thoroughness, and his numerous patients were deeply appreciative of the skill and kindly care he bestowed on them. He continued to serve at this special work until the end of the war and in the chapel of the citadel of Cairo he was married. In the summer of 1919 he resumed his practice again in Aberdeen, where his early death is universally regretted.

H. W. writes: By his death a surgeon has been lost to Scotland who would in time have made for himself a position in the front rank of his profession, but his many friends will most frequently think of him as they so often met him—free and wandering through the country lanes he loved so much, pointing out the features of the bird life of the district, the haunts and habits of which were to him a never-ending source of pleasure and satisfaction. One could not but feel that, in addition to his many human friends, he had also in his heart a keen love of all bird and animal life, and wished all well. The keen sympathy of all goes out to the members of his family in the loss they have sustained, and to his widow, who is left with her young fatherless son.

WILLIAM MURRAY, M.D. DURH., F.R.C.P. LOND.,

CONSULTING PHYSICIAN TO THE NEWCASTLE-ON-TYNE HOSPITAL FOR SICK CHILDREN.

Dr. William Murray, who died suddenly on Oct. 2nd at Longtown, Cumberland, aged 81, was son of the late George Murray, of Chester-le-Street, Durham, and was educated at Durham School. He became apprenticed to Sir John Fife, surgeon to the Newcastle Infirmary, where he studied medicine. On coming to London he entered at University College Hospital, and later filled the post of house physician under Sir William Jenner and Sir Alfred Garrod. Dr. Murray qualified as M.R.C.S. Eng. and L.S.A. in 1859, took his M.D. at Durham three years later, and became F.R.C.P. in 1872. On his return to Newcastle he was appointed lecturer on physiology at the College of Medicine, a post which he held for 14 years. He was also physician to the Newcastle Dispensary, the Fever Hospital, and the Hospital for Sick Children, of which institution he was one of the founders. Dr. Murray was one of the first to introduce the treatment of aneurysm of the abdominal aorta by compression, and he recorded a case cured by this method in 1872. He was also the author of articles on aneurysm in Reynolds's "System of Medicine" and in Heath's "Dictionary of Surgery." He wrote a book on "Inductive Method in Medicine" and a useful little manual entitled "Rough Notes on Remedies," which ran through six editions. This book is a compendium of the therapeutics of its day, and covers an extraordinarily large field of practice. Actively interested in all that concerned the public welfare Dr. Murray founded two branches of the Y.M.C.A., one at Carlisle and another at Newcastle, of which he had been president. The rod and the gun were his hobbies. By his marriage in 1864 with Frances Mary, daughter of Giles Redmayne, of Brathay Hall, Ambleside, he had three sons and three daughters, all of whom survive him, the eldest son being Dr. George R. Murray, professor of systematic medicine in Manchester University. By a second marriage in 1885 with the widow of Colonel A. Lecton-Blenkinsopp he leaves two daughters. Dr. Murray retired from practice in 1913.

Medical News.

UNIVERSITY OF LONDON.—The Vice-Chancellor of the University of London, Dr. S. Russell Wells, attended the opening ceremony of St. Mary's Hospital Medical School and addressed a few words to the students, reminding them that the University mace on the chairman's table should be regarded as a symbol of the connexion of the students of all the London medical schools with their University. He asked them to remember that even those who were studying for the Diploma of the Conjoint Board were members of the University of London, which was entitled to their affection and loyalty.

The following details of courses of Advanced Lectures in Physiology, the precise dates of which will be announced later, have been arranged for the session 1920–21:—

At the University Buildings, South Kensington, First Term: "Experimental Studies in Vegetable Physiology and Vegetable Electricity," eight lectures by Professor A. D. Waller (in conjunction with Mr. J. C. Waller, M.A.), on Tuesdays, at 5 P.M., beginning on Oct. 12th. At King's College, First Term: "Histology of the Nervous System," eight lectures, accompanied by demonstrations of specimens, by Dr. C. Da Fano, on Wednesdays, at 4.30 P.M., beginning on Oct. 13th. At St. Bartholomew's Hospital, Third Term: Eight Lectures by various lecturers to be arranged by Professor F. A. Bainbridge. At Guy's Hospital, Second Term: "The Physiology of the Embryo, Fœtus and Newly Born," eight lectures by Professor M. S. Pembrey, on Thursdays, at 4.30 P.M. At the London Hospital Third Term: "Reception of Sensory Stimuli," eight lectures by Professor H. E. Roaf. At a place to be arranged, Second Term: "Bio-Chemistry," eight lectures, by Mr. J. A. Gardner, F.I.C.

These courses are recognised as advanced lectures which a candidate at the B.Sc. Honours Examination may name for part of his examination. The following scheme of intercollegiate advanced work in physiology has been approved for the Honours B.Sc. Examination. Students of the participating Colleges are free to attend all the courses.

At University College, First Term: "Physical Chemistry in Relation to Physiology," by Professor W. M. Bayliss. At King's College, Second Term: "Advanced Chemical Physiology," by Professor W. D. Halliburton and Dr. O. Rosenheim, Ph.D. At Bedford College, Third Term: "Advanced Practical Histology," by Dr. J. S. Edkins. At St. Bartholomew's Hospital, Third Term: "Electrical Changes in Skeletal and Cardiac Muscle." Course of practical work by Professor F. A. Bainbridge. At Guy's Hospital, Second Term: "Practical Work on Respiration," by Professor M. S. Pembrey.

Inquiries should be addressed to the heads of the laboratories at which the lectures will be delivered. In the case of the courses to be given by Professor Waller and Mr. Gardner inquiries should be addressed to Professor Waller, F.R.S., Physiological Laboratory, University of London, South Kensington, S.W.7.—An additional second examination for Part I. as well as for Part II. of the second examination for medical degrees will be held on Dec. 1st and 7th respectively. Application, accompanied by the proper fee and certificate, must be made to the Academic Registrar before Oct. 18th.—The following elections to Scholarships and Exhibitions have been made:—

Marion G. Palmer, of the North London Collegiate School, to the Bucknill Scholarship of 135 guineas, tenable in the Faculty of Medical Sciences, University College, and at University College Hospital Medical School; Morris Cutner, of King's College, London, and John Henry Milnes Walker, of Oundle School, to Medical Exhibitions of the value of 55 guineas each, tenable at University College.

Charing Cross Hospital Medical School.—The scholarships, medals, prizes, and certificates were distributed by Lady Dunboyne on Oct. 1st. The governor's clinical gold medal was awarded to Miss G. Cooper. An appeal was made by Mr. G. Verity for the new institute of pathology, which was badly in need of funds.

London (Royal Free Hospital) School of Medicine for Women.—The winter session was opened on Oct. 1st by Miss Maude Royden, who gave an address on Revolutionary Thought. Miss Royden regarded the change of attitude from the

period at which women were regarded as "natural invalids" as in no small part due to the skill of women in medicine and surgery. Her address was well received by a large gathering of friends of the school. The following entrance scholarships have been awarded:—

Miss E. Masterman (Hamilton House School, Tunbridge Wells), St. Dunstan's Medical Exhibition; Miss E. Adams Clarke (Sydenham High School), Isabel Thorne Scholarship; Miss F. I. Moore, Mabel Sharman Crawford Scholarship; Miss M. Bowstead, Sir Owen Roberts Memorial Scholarship; Miss E. H. R. Newboult, Lewis Memorial Scholarship.

Guy's Hospital Medical School.—The following entrance scholarships have been awarded:—

Senior Science Scholarship for University Students (War Memorial Scholarship): £75, Nils Lövold Eckhoff, University of Cape Town; £80, Harold Charles Beccle, University College; £35, George Thompson Henderson, B.A., Gonville and Caius College, Cambridge. Junior Science Scholarships: £120, Reginald Albert Nash, Preliminary Science Class, Guy's Hospital; £50, Alfred Beresford Plant, Preliminary Science Class, Guy's Hospital. War Memorial Scholarship (providing a free medical education for five years; annual value about £40): Kenric Charles Billingham, Brighton, Hove, and Sussex Grammar School. Entrance Scholarship in Arts: £100, Edward Ian Ransford Marsden, Cheltenham College.

University College Hospital Medical School.—The Goldsmid Entrance Exhibitions of 112 guineas each have been awarded to F. Hudson and M. Robinson, both of University College, London.

UNIVERSITY OF DURHAM: FACULTY OF MEDICINE.—At special examinations held recently the following candidates were successful:—

THIRD EXAMINATION FOR DEGREE OF BACHELOR OF MEDICINE.

Materia Medica, Pharmacology, and Pharmacy; Public Health; Medical Jurisprudence; Pathology and Elementary Bacteriology.—Frederick Joseph Armstrong, John Caine Boyde, Robert Archibald Brown, Robert Howie Burnett, Mary Douglass, Anne Fairweather, Thomas Kirsopp, Mary Manners, Robert Manners, George Alexander Mason, Hugh Leslie Mather, Sydney James Craufurd Smith, Phyllis Mary Walker, and Robert Paulin Wanless.

SECOND EXAMINATION FOR DEGREE OF BACHELOR OF MEDICINE.

Anatomy and Physiology.—Thomas Henry Blench, William Anderson Carruthers, Charles Victor Harrison, Phillis Hall, Bernard Robert Isaacs, James Stanley Johnson, Colin McCulloch, George Müller Miller, Robert Graham Melrose, John Ezra Dunlop Miller, Donald Sutherland Sinclair, William Frank Ojumiri Taylor, Edward Anthony Welsh, and Alexander James Watson.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH, ROYAL COLLEGE OF SURGEONS OF EDINBURGH, AND ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.—At a recent examination of the Board the following candidates, having passed the First and Second Examinations, were admitted Diplomates in Public Health:—

Lloyd Huntly Werden, Joseph Chalmers, Ronald Thomson Grant, John Young, Alfred Vincent Dill, Frederick John Carlyle Johnstone, Allan Wotherspoon, John James Rouse Binnie, Arthur Kinsey Towers, Dugald Ferguson, Frederick John Kirkness, Margaret McNaughton McGarrity, George Maxwell Elliott, George Clazy McEwan, James McIntyre, George James Linklater, Gladys Annie Adeline Boyd, John Fearby Campbell Haslam, George Nicholson, William Semple Wallace, David Leishman Baxter, Rosanna Elizabeth MacMillan, Elizabeth Harper, Edmund Brodie Munro, Thomas Douglas Inch, Ian Charles Mackenzie, Alexander Patrick Gordon Lorimer, and Francis Gregory Foster.

HOSPITAL DINNERS.—*St. Bartholomew's Hospital Medical School Dinner.*—"Bart.'s" men had not met for seven years and Sir Gordon Watson, who made the arrangements, soon found that the Great Hall of the hospital would not seat all those who wished to be present. The Lord Mayor of London generously placed the City Guildhall at the disposal of the City hospital, and 350 sat down there on the evening of Oct. 1st. Both Presidents of the Royal Colleges were present: Sir Anthony Bowlby occupied the chair and Sir Norman Moore proposed the toast of "The Hospital and School." Both Regius Professors were there: Sir Clifford Allbutt as guest, Sir Archibald Garrod, lately head of the hospital medical unit, in his own right. Lord Horne replied to the toast of "The Forces," and Sir Arthur Lawley for "The Guests"; the former was eloquent of the services of the great London hospitals in the war, and the latter no less so in regard to their prospects of beneficence in an ominous peace. The gathering was strictly in the nature of a family party and few forms were observed, but even so the reception accorded to Sir Anthony Bowlby was remarkable.

Charing Cross Hospital Past and Present Students' Dinner.—Dr. J. Mitchell Bruce presided at the annual dinner of the past and present students of Charing Cross Hospital, which was held in the Adelaide Hall (Gatti's Restaurant) on Oct. 4th, when quite a large company was present. The speakers throughout expressed generally a hopeful tone in regard to the future of medicine, but all agreed that there was an abundance of hard work before them. Dr. T. W. Eden, in proposing the toast of "The Hospital and School," referred to the state merging on bankruptcy to which they at one time had been brought, but they were now happily solvent. In this connexion he reminded them that Dr. Addison, a past dean of the school, had laid the foundations of the success which they now enjoyed. Dr. W. Hunter next took up the position with great earnestness of purpose. In conclusion, Dr. Eden referred to the cordial relations existing between the hospital and school. The Dean of the school, Dr. W. J. Fenton, replied, and in an interesting speech indicated the directions in which future medical study should go. He emphasised the importance of giving greater attention to biochemical problems, and referred to the success of the adoption of whole-time teaching and the importance of original work. Sir Herbert Waterhouse proposed the toast of "The Guests," which was brightly replied to by Sir James Cantlie and Mr. J. F. Tower. The toast of "The Chairman" was proposed by Mr. George Verity, who has rendered very valuable service to the hospital, and Dr. Bruce, in his words of thanks, referred warmly to this service.

St. Mary's Hospital Past and Present Students' Dinner: Presentation to Dr. M. M. Bird.—About 160 past and present students assembled at the Connaught Rooms on Oct. 1st, under the presidency of Sir John Goodwin, himself an old Mary's man. The guests included Sir Robert Hill, Director-General, Medical Department, R.N., Dr. S. Russell Wells, and Professor G. Adami, Vice-Chancellors respectively of the Universities of London and Liverpool. The event of the evening was the presentation of an address and a cheque for £450 to Dr. M. Mitchell Bird on his retirement after 32 years' service as medical superintendent of the hospital. Sir John Goodwin, in making the presentation, recalled an incident of a youthful blunder of his own when a resident, and an abusive notice in a lay paper. Instead of a reprimand from the medical superintendent he received words of encouragement and an assurance that "we shall pull through all right," as indeed they did. The ovation accorded to Dr. Bird when he rose to reply was an indication of the love and esteem he had inspired in the 1000 students who had passed through his hands, and who, as he said in his brief reply, had for the most part continued in close touch with him throughout their careers.

St. Thomas's Hospital Old Students' Dinner.—Nearly 150 past students gathered at the Connaught Rooms on Friday, Oct. 1st. Dr. F. F. Caiger, medical superintendent of the South-Western Fever Hospital, occupied the chair; amongst those present were Sir Arthur Stanley, Sir Cuthbert Wallace, Sir Charles Ballance, and Sir Seymour Sharkey. The chairman recalled personal memories of the hospital, many of them of an amusing nature, the earliest dating from his school days, and described various departments as he knew them when a student, contrasting their conditions with those obtaining at the present time. He proposed success to the hospital and medical school. Sir Arthur Stanley, replying as treasurer, expressed regret at the absence of Sir James Wainwright, his predecessor in that office, and spoke of the alterations and renovations now in progress. He went on to refer with optimism to the difficulties encountered at a time when revenue had not increased in proportion to expenditure. St. Thomas's, he said, had appealed to the working class, the only class whose economic condition had been bettered during the war; to the honour of the workers their voluntary support had proved slightly more substantial than that afforded by a system of compulsory payment in force elsewhere, and had showed the esteem in which the hospital was held by its patients. Sir Cuthbert Wallace, responding as dean of the medical school, gave reminiscences of previous holders of that position, and referred to the inauguration of the medical unit which is shortly to take place. He passed on to appeal for further support for the war memorial, for which space is now being acquired as rapidly as possible. The evening closed with an ovation following the proposal of the chairman's health by Dr. H. G. Turney, senior physician to the hospital.

DEPARTMENT OF INDUSTRIAL MEDICINE, ST. MARY'S HOSPITAL.—A luncheon was held on Oct. 1st at the Great Central Hotel to inaugurate the appeal for funds to establish a department of industrial medicine at St. Mary's Hospital. The first speaker was Mr. T. M. Taylor, who spoke of the general interest in the scheme already shown by the press and the public, and invited the further coöperation of the former. He referred briefly to the successful handling of the diseases from which munition and aeroplane workers had suffered in the earlier years of the war, but had no time to give more than a brief indication of the probable results of further study of industrial diseases. Sir Almroth Wright, director of the Pathological Institute, then spoke. He said that in medicine practice is always outrunning knowledge, and that at present this must be so. Advice was given to patients to the best of the doctor's ability, but the doctor himself knew only too well that he was not always competent to give it. Sir Almroth Wright therefore

considered that a hospital ought to have two staffs—one to apply the knowledge already available, and the other a research staff. At St. Mary's the directors of departments of the Pathological Institute were now recognised as members of the staff of the hospital. He dwelt on the importance of having both staffs attached to a hospital instead of segregating researches in a separate institution; one advantage was the ease with which the research worker could obtain material selected and sent on to him by the clinician. Sir Almroth Wright then proceeded to the subject of industrial medicine. In the Crimea ten men died from disease for every one who died from an injury; this disease mortality in war had been prevented only by medical concentration on the "soldiering" industry and equally marvellous results would be obtained if equal attention were given to conditions of life, work, and ill-health in other industries. The appeal committee, in addition to the names given in our issue of Sept. 25th, p. 676, has been strengthened by the addition of Mr. Clynes and Mr. J. H. Thomas. Donations should be sent to Mrs. Lloyd George, 10, Downing-street, S.W.1, or to the dean at St. Mary's Medical School, Paddington, London, W.1.

WEST LONDON POST-GRADUATE COLLEGE.—A series of lectures will be given during the present session in the lecture room of the Post-Graduate College, West London Hospital, Hammersmith, W., on Thursdays at 5 P.M., starting on Thursday next, Oct. 14th, with a lecture on the Principles of Internal Secretion by Dr. W. Langdon Brown. The subjects of future lectures will be announced in our Medical Diary. The lecturers will include Mr. H. Tilley, Sir James Galloway, Dr. J. Walter Carr, Dr. E. W. G. Masterman, Mr. Swinford Edwards, Dr. T. M. Legge, Sir J. Dundas Grant, Dr. F. J. Poynton, and Lady Barrett. These lectures are open without fee to medical practitioners, who will be cordially welcomed.

ROYAL SANITARY INSTITUTE.—A sessional meeting will be held on Friday, Oct. 15th, in the Mansion House, Doncaster, at 7.30 P.M., when a discussion on Some Aspects of the Housing Question will be opened by Dr. Harold Scurfield. The chair will be taken by Professor H. R. Kenwood. On the same day at 3 P.M. a paper will be read by Dr. A. W. Frew on Venereal Disease as a Sociological Problem, and on Saturday, Oct. 16th, at 10 A.M., a visit of inspection will be paid to houses completed and in course of erection in Carr House-road. Fifty-four houses on the Dorman Long Steel Frame System of Construction are being erected on this site, in addition to those of brick. At 3.30 P.M. a discussion on the Value of Practical Experience in Food Inspection will be opened by Mr. J. S. Lloyd, F.R.C.V.S., chief veterinary inspector of Sheffield. Those proposing to attend the meetings are asked to notify the honorary local secretary, Dr. Lechmere Anderson, medical officer of health, Public Health Office, Doncaster, not later than Oct. 9th, so that the necessary arrangements may be made.

MAUDSLEY HOSPITAL, DENMARK HILL, LONDON.—The first part of the second course for a diploma of Psychological Medicine is announced. Sir F. W. Mott will deliver eight lectures on the Anatomy of the Nervous System on Tuesdays, at 2.30 P.M., beginning on Oct. 12th; Dr. Henry Devine will give eight lectures on Psychology on Thursdays, at 2.30 P.M., beginning on Oct. 14th; and Dr. F. L. Golla will give eight lectures on the Physiology of the Nervous System on Fridays, at 3 P.M., beginning on Oct. 22nd. A syllabus is in preparation in accordance with the regulations of the London University, Cambridge University, and Conjoint Board Diploma of Psychological Medicine, and will be issued shortly. Part II. of the second course will be held in January, 1921.

ROYAL NATIONAL ORTHOPÆDIC HOSPITAL.—A meeting will be held at the Mansion House on Friday, Oct. 15th, at 3 P.M., in support of the appeal for this hospital. The Lord Mayor will preside, and H.R.H. Prince Henry will be among the speakers. The present buildings of the hospital, which are new and up to date, were opened in 1908 and contain 200 beds, but these have proved insufficient to cope with the demands for admission, and more than a thousand children are now on the waiting lists. The accommodation for out-patients has also been found inadequate, since the attendances have grown from 11,000 in 1908 to nearly 60,000 in 1919. The sum of £200,000 is required: (1) to extend the present buildings on an adjoining site already acquired, and so provide—(*a*) adequate space for dealing with out-patients and applying new methods of treatment, (*b*) accommodation for paying patients and for additional medical and nursing staffs, (*c*) the foundation of a school of orthopædics for students and post-graduates, (*d*) space for the extension of the workshops for making surgical appliances and surgical boots; (2) to form a large country branch with 200 to 300 beds for children. An influential special appeal committee is in course of formation, with the Earl of Denbigh as chairman.

KING GEORGE'S FUND FOR SAILORS.—Mr. J. F. Drughorn, whose firm during the war lost their fleet of nine ships through submarines, has sent a cheque for £10,000 to the Lord Mayor of London to be devoted to the King George's Fund for Sailors.

THE Minister of Health has appointed Dr. Alexander Macphail to be a medical officer of the Ministry. Dr. Macphail was formerly professor of anatomy in St. Mungo's College, Glasgow, lecturer in anatomy at St. Bartholomew's Hospital, and secretary of the Anatomical Supplies Committee of Great Britain. His first duties in the Ministry of Health will be in connexion with the administration of the Anatomy Acts, which has been transferred to the Ministry from the Home Office.

TAVISTOCK CLINIC FOR FUNCTIONAL NERVE CASES. A course of ten lectures on Elementary Psychotherapy will be given by Dr. H. Crichton Miller, at 51, Tavistock-square, W.C., at 5.15 P.M., on Mondays, beginning Oct. 11th. The syllabus is as follows:—

1. Organic and Functional: Toxins, Endocrines, and Emotions.
2. Persuasion: Conscious Mental Methods; Waking Suggestion; Faith Healing; Quackery.
3. Hypnotism and Suggestion: Their Applications in Modern Practice.
4. The Unconscious Motive.
5. Emotional Development: The Child and the Adult; Sex Characteristics.
6. Mental Mechanisms: Conflict; Regression; Repression; Complex Formation; Transference.
7. Analytical Methods: Dream Interpretation; Word Association; Hypnoidal Analysis.
8. Dream Symbolism.
9. The Herd Instinct in the Light of Analytical Psychology.
10. Ethical Aspects of Psychotherapy.

Tickets for the course may be obtained from Mrs. Leith-Ross, the honorary secretary, at the clinic.

THE FEDERATION OF MEDICAL AND ALLIED Societies.—The ordinary monthly meeting of the Executive Council was held at 11, Chandos-street, Cavendish-square, on Sept. 28th. With few exceptions, all the members of the Council were present, and the special business under consideration was the possible effect of Clause 11 of the Ministry of Health (Miscellaneous Provisions) Bill, especially Section 1 (*a*), (*b*), (*c*) of that clause. After full discussion the following resolutions were adopted by the meeting:—

"That the constituent bodies in the Federation be asked to consider at an early meeting the Ministry of Health (Misc. Provs.) Bill with particular reference to Clause 11, I. (*a*), (*b*), (*c*), and with a view to a Conference of those bodies on the matter during the first week in November."

"That the Royal College of Physicians, the Royal College of Surgeons, the Society of Apothecaries, and the B.M.A. be also asked to consider Clause 11, I. (*a*), (*b*), (*c*) of the Ministry of Health (Misc. Prov.) Bill, and subsequently attend the Conference."

"That a deputation, which the Royal Colleges, the Society of Apothecaries, and the B.M.A. be invited to join, be arranged for to wait upon the Minister of Health and ask him to withhold his approval of schemes proposed with regard to the municipal control of hospitals until the medical and allied professions have had an opportunity of expressing their opinions thereon."

On the reappointment of Dr. N. Howard Mummery as general secretary of the Federation the meeting unanimously expressed its appreciation of the manner in which he had carried out the duties of the office during the past year. A number of candidates were admitted to Associate Membership.

THE CLAIMS OF EX-SERVICE DOCTORS.—At a largely attended public meeting held in the Town Hall, Aberystwyth, on Sept. 30th, presided over by Alderman C. M. Williams, a strong protest was made by ex-Service men against a recent appointment by the guardians of a medical officer and public vaccinator for the borough in place of the late Dr. Bonsall. The only applicants for the post were Major A. Thomas, M.B., T.D., R.A.M.C., and Dr. J. Arthur Rees, and the latter was appointed by 18 votes to 12. The 12 votes represented the solid vote of the town representatives. Following upon this decision the Aberystwyth branch of the Discharged Soldiers' and Sailors' Federation sent a strongly worded protest to the Ministry of Health, in which attention was drawn to the great services rendered by Dr. Thomas during the war, having joined up on August 4th, 1914, and continued to serve abroad until 1919. When he left home his practice was the largest in the neighbourhood, but now it was only 50 per cent. of what it was, the public apparently having short memories for those who had served them in the war. During the illness of Dr. Bonsall, Dr. Thomas acted as his deputy, but this fact and his services made no appeal to the guardians, and in defence the Federation asked the Ministry of Health not to sanction the appointment of Dr. Rees. At the public meeting Captain B. T. Lloyd moved a resolution appealing to the Ministry of Health not to sanction the appointment. This was carried, as well as a second resolution, moved by Major Fossett Roberts, calling upon the guardians to rescind the resolution.

HACKNEY COLLEGE.—In connexion with the opening of the session at Hackney College, London, N.W., the annual Drew lecture will be given by Dr. J. A. Hadfield on Tuesday, Oct. 12th, in the library of the Memorial Hall, Farringdon-street, London, E.C. Dr. Hadfield has chosen as his subject, "Immortality in its Relation to Psychic Phenomena."

GREAT NORTHERN CENTRAL HOSPITAL. — The Arsenal Football Club have decided to endow a bed in this hospital; the donation, amounting to 1000 guineas, will be paid in annual instalments.

DEVIZES COTTAGE HOSPITAL.—At a carnival recently held at Devizes over £800 was raised for the funds of the local cottage hospital.

DEVON INSURANCE COMMITTEE. — At the last meeting of the Devon Insurance Committee it was reported that there were 140,411 insured persons in the county area; 112,000 of these had been accepted by the doctors, 28,000 were not on "a doctor's panel." There were 260 medical men and 160 chemists on the "panel list." It was also stated that the subcommittee had sent a resolution to the Ministry of Health drawing attention "to the present inadequacy of the accommodation for the treatment of tuberculous ex-Service men."

Appointments.

Successful applicants for vacancies, Secretaries of Public Institutions, and others possessing information suitable for this column, are invited to forward to THE LANCET *Office, directed to the Sub-Editor, not later than 9 o'clock on the Thursday morning of each week, such information for gratuitous publication.*

PINTO-LEITE, H., M.R.C.S., L.R.C.P. Lond.; has been appointed Honorary Assistant Administrator of Anæsthetics to the Westminster Hospital and Anæsthetist to the Hospital of St. John and St. Elizabeth.

RAISON, C. A., M.B., Ch.B. Birm., Surgical Registrar at the General Hospital, Birmingham.

RATNER, E., M.B., Ch.B. Manch., Second Assistant Medical Officer to Monsall Fever Hospital, Manchester.

STIELL, W. F., M.R.C.S., L.R.C.P. Lond., one of the Medical Referees under the Workmen's Compensation Act, 1906, for County Court Circuit No. 17.

Vacancies.

For further information refer to the advertisement columns.

Aberdeen Royal Hospital for Sick Children.—Hon. S., Ear, Nose, and Throat. Hon. P., Dis. of Skin.
Abergavenny, Monmouthshire Asylum.—Jun. Asst. M.O. £350.
Ashton-under-Lyne District Infirmary.—Two Asst. H.S.'s. £200.
Ayr District Asylum.—Jun. Asst. P. £300.
Battersea General Hospital (Incorporated), Battersea Park, S.W.—Third Res. M.O. £200.
Bedford County Hospital.—Asst. H.S. £150.
Birkenhead Borough Hospital.—Hon. Radiographer.
Bombay Municipal Hospitals.—Med. Supt. Rs. 1000 per month.
Brighton, Royal Sussex County Hospital.—Jun. H.S. £150.
Bristol Royal Infirmary.—H.P. and H.S. £120 each.
Brompton Hospital Sanatorium, Frimley.—Asst. Res. M.O. £250.
Bury and District Joint Hospital Board.—Res. Asst. Med. Supt. £450.
Cardiff, King Edward VII. Hospital.—Res. Surg. O. £300.
Carnegie Dunfermline Trust.—Asst. M.O. £500.
Colonial Service.—M.O.'s for West African Medical Staff, Government Service in Malaya, East African Protectorates, West Indies (including British Guiana), Fiji, and the Western Pacific, &c.
Coventry and Warwickshire Hospital, Coventry.—Two Hon. P.'s.
Dorset County Council.—Asst. County M.O. £500.
Dumfries, Crichton Royal.—Asst. P. £350.
Dumfriesshire Education Authority.—Two Med. Asst.'s. £500.
East London Hospital for Children and Dispensary for Women, Shadwell, E.—Cas. O. £120.
Finsbury Dispensary, Brewer-street, Goswell-road, E.C.—Res. M.O. £250.
Greenock Infirmary.—H.S. £150.
Hampstead General and North-West London Hospital, Haverstock Hill, N.W.—Radiologist. £50.
Hospital for Consumption and Diseases of the Chest, Brompton, S.W.—H.P. 30 guineas.
Hospital for Women, Soho-square, W.—Res. M.O. £100.
Huddersfield Royal Infirmary. Two Asst. H.S.'s. £150 each.
Johannesburg, University College.—Sen. Lect. in Physiology. £516.
Leeds Public Dispensary.—Res. M.O. £200.
Liverpool, Royal Southern Hospital.—H.S. £100.
London Missionary Society, 48, Broadway, London, S.W.—Med. Men and Women for India and China.
Maidstone, Kent County Mental Hospital.—Jun. Asst. M.O. £300.
Maidstone, West Kent General Hospital.—Two H.S.'s. £220.
Manchester, Ancoats Hospital.—Res. Surg. O. £250. Hon. Dent. S.
Manchester Education Committee.—Asst. Sch. M.O. £600.
Manchester, Withington Institution and Hospitals, Nell-lane, West Didsbury.—Res. Asst. M.O. £300.
Montrose Royal Asylum.—Asst. M.O. £350.
National Hospital for Diseases of the Heart, Westmoreland-street, W.—Res. M.O. £150.
Newcastle-upon-Tyne, Royal Victoria Infirmary.—H.P.'s and H.S.'s. £50 each. H.S. to Out-patient Dressing Dept. £100.
Newport (Mon.) Education Committee.—Asst. Sch. M.O. and Med. Inspector of Schools. £600.
Northampton, County Borough Education Committee.—Female Asst. Sch. M.O. £500.
Nottingham City.—Asst. M.O.H. £800.
Oxford, Radcliffe Infirmary and County Hospital.—Administrator. £600.
Paddington Green Children's Hospital, Paddington Green, W.—H.P. and H.S. £150 each.
Plymouth, South Devon and East Cornwall Hospital.—H.S. £200.
Prince of Wales's General Hospital, Tottenham.—Hon. Med. and Surg. Registrars. £100 each. Also Hon. Asst. P.
Reading, Royal Berkshire Hospital.—H.S. £200.
Rochdale Union, Birch Hill Infirmary.—Res. M.O. £500.
Rotherham Hospital.—Jun. H.S. £150.
Royal Chest Hospital, City-road, E.C.—H.P. £120.
Royal Waterloo Hospital for Children and Women, Waterloo-road, S.E.—Jun. Res. M.O. £100.
St. Helens, Lancs., Pilkington Special Hospital.—Asst. £400.
Salford Royal Hospital.—H.S. and Cas. H.S. £150 each.
Sheffield Royal Infirmary.—H.S. £150.
South Mimms, near Barnet, Clare Hall Sanatorium, Middlesex Districts Joint Small-pox Hospital Board.—Res. Asst. M.O. £300.
Taunton and Somerset Hospital.—Jun. H.S. £150.
Tottenham Education Committee.—Asst. Sch. M.O. £650.
Warrington Infirmary and Dispensary.—Jun. H.S. £200.
West London Hospital, Hammersmith, W.—H.P. £50.
Wolverhampton and Staffordshire General Hospital.—H.S. £200.
Worcester County and City Mental Hospital, Powick.—Jun. Asst. M.O. £350.
The Chief Inspector of Factories, Home Office, S.W., gives notice of a vacancy for a Certifying Surgeon under the Factory and Workshop Acts at Penmachno.

Births, Marriages, and Deaths.

BIRTHS.

BATTEN.—On Sept. 29th, at Ladbroke-square, W., the wife of Lindsey W. Batten, M.R.C.S., of a son.
GIBSON.—On Sept. 28th, at King's College Hospital, the wife of Surgeon-Lieutenant-Commander P. L. Gibson, R.N., of a son.
GOSS.—On Sept. 25th, at "Mount Pleasant," Wanstead, the wife of W. Ethard Goss, of a son.
MARLE.—On Sept. 29th, at Redmount, Buckfastleigh, the wife of S. Marle, M.R.C.S., L.R.C.P., of a daughter.
WALKER.—On Oct. 3rd, at Charlbury-road, Oxford, the wife of Dr. E. W. Ainley Walker, of a daughter (stillborn).

MARRIAGES.

MCNAUGHTAN—KINLOCH—On Sept. 29th, at St. George's Parish Church, Edinburgh, Major W. McNaughtan, O.B.E., R.A.M.C., to Peggy, daughter of Charles Kinloch, Esq., Corner House, Queensferry-road, Edinburgh.

DEATHS.

MITCHELL.—On Sept. 13th, at Rossnowlagh, Co. Donegal, James Mitchell, L.R.C.P., L.R.F.P.S., L.M., of Rossnowlagh and Castlederg, and formerly of Manchester.
MURRAY.—On Oct. 2nd, suddenly, at Scaurbank, Longtown, Cumberland, William Murray, M.D. Durh., F.R.C.P. Lond., formerly of Newcastle-on-Tyne, aged 81 years.
VÉREL.—At Aberdeen, on Oct. 29th (from septicæmia), Raymond Vérel, O.B.E., M.B., F.R.C.S. (Ed.), aged 34, Capt. R.A.M.C. T.F., late of Scottish Horse Bde. Fld. Amb., E.E.F., and of Citadel and Nazerieh Hospitals, Cairo.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

BOOKS, ETC., RECEIVED.

ALLAN, PHILIP, AND CO., Quality-court, Chancery-lane, W.C.
The Immortal Caravel: A Book of Thoughts and Aphorisms. By Arthur Lynch. (The Pilgrim's Books.) Pp. 196.
Gorgeous Poetry, 1st Series. By J. B. M. Pp. 64. 2s.

ALLEN, GEORGE, AND UNWIN, LTD., London.
The Autobiography of Judas Iscariot. By A. T. Sheppard. Pp. 291. 7s. 6d.
One Man's Initiation—1917. By John Dos Passos. Pp. 128. 6s.
The Origin and Evolution of Freemasonry. By A. Churchward, M.D. Pp. 239. 12s. 6d.
The State and Sexual Morality. Pp. 78. 1s. 6d.

AMERICAN MEDICAL ASSOCIATION PRESS, Chicago.
George Miller Sternberg. A Biography by his Wife, Martha L. Sternberg. Pp. 332.

BAILLIÈRE, TINDALL, AND COX, London.
Index of Practical Nursing. By J. B. Cook, M.D. 2nd ed. Pp. 238. 6s.
Surgical Nursing and Technique: A Book for Nurses, Dressers, House Surgeons, &c. By C. P. Childe, F.R.C.S. Eng. 3rd ed. Pp. 237. 6s.

BLAKISTON'S, P., SON AND CO., Philadelphia.
A Manual on Foot-Care and Shoe-Fitting. For Officers of the U.S. Navy and U.S. Marine Corps. By W. L. Mann, M.D., and S. A. Folsom, M.D. Pp. 124.
The Nose, Paranasal Sinuses, Nasolacrimal Passage-ways, and Olfactory Organ in Man. A Genetic, Developmental, and Anatomico-Physiological Consideration. By J. P. Schaeffer, M.D. Pp. 370.

CHURCHILL, J. AND A., London.
The Anatomy of the Human Skeleton. By Prof. J. E. Frazer, F.R.C.S. Eng. 2nd ed. Pp. 284. 36s.
A Text-book of Materia Medica. Designed for Students of Pharmacy and Medicine. By H. G. Greenish, F.I.C., F.L.S. 3rd ed. Pp. 568. 21s.
Hygiene. Specially intended for those Studying for a Diploma in Public Health. By W. W. Jameson, M.D., and F. T. Marchant, M.R. San.I. Pp. 404. 18s.

EVELEIGH NASH CO., London.
Warfare in the Human Body. By Morley Roberts. With an Introduction by Professor Arthur Keith, M.D., F.R.C.S., F.R.S. Pp. 286. 18s.

FROWDE, HENRY, AND HODDER AND STOUGHTON, London.
Tropical Ophthalmology. By R. H. Elliot, M.D., Sc.D. Pp. 525. 31s. 6d.
The Development of the Human Body. A Manual of Human Embryology. By J. P. McMurrich, Professor of Anatomy, University of Toronto. 6th ed. Pp. 501. 18s.

ROUTLEDGE, GEORGE, AND SONS, London.
An Improvement on Twilight Sleep: Painless Childbirth. Eutocia and Nitrous Oxid-Oxygen Analgesia. By C. H. Davis, A.B., M.D. Pp. 160. 5s.

ST. CATHERINE PRESS, Stamford-street, London, S.E.
What to Tell our Grown-up Sons about Women. By the Widowed Physician. Pp. 24. 1s.

SAUNDERS, W. B., COMPANY, LTD., London.
Orthopædic and Reconstruction Surgery. By Fred H. Albee, M.D. Pp. 1138. 50s. net.
Modern Surgery, General and Operative. By J. Chalmers DaCosta, M.D. 8th ed. Pp. 1708. 37s. 6d.
Sexual Impotence. By Victor G. Vecki, M.D. 6th ed. Pp. 405. 16s.
Human Parasitology. By Damaso Rivas, M.D. Pp. 700. 35s.
An Epitome of Hydrotherapy. By Simon Baruch, M.D. Pp. 205. 10s.
The Duodenal Tube and its Possibilities. By Max Einhorn, M.D. Pp. 122. 13s.

URBAN AND SCHWARZENBERG, Berlin and Vienna.
Ohrenheilkunde für den praktischen Arzt. Von Dr. R. Leidler. Pp. 278. M. 30.
Medizinische Terminologie: Ableitung und Erklärung der gebräuchlichsten Fachausdrücke aller Zweige der Medizin und ihrer Hilfswissenschaften. Von W. Guttmann. Pp. 1311. M. 90.
Die Impotenz des Mannes (Die psychischen Störungen der männlichen Sexualfunktion). Von Dr. W. Stekel. Pp. 484.

WRIGHT, J., AND SONS, Bristol.
Injuries of the Peripheral Nerves. By H. S. Souttar, F.R.C.S., and E. W. Twining, M.R.C.S., L.R.C.P. Lond. Pp. 152. 18s. 6d.
A Synopsis of Surgery. By E. W. Hey Groves, M.S., M.D. 5th ed. Pp. 620. 17s. 6d.

Communications, Letters, &c., to the Editor have been received from—

A.—Prof. G. Adami, Liverpool; Mr. N. Alder, Hove.
B.—Dr. W. Burridge, Paignton; Belfast, Chief Tuberculosis Officer of; Dr. M. W. Browdy, Manchester; Sir J. R. Bradford, Lond.; Messrs. Burroughs Wellcome and Co., Lond.; Dr. J. S. Bury, Manchester.
C.—Mrs. A. E. Cockerill, Ilfracombe; Dr. H. P. Cholmeley, Forest Row; Mr. F. R. Cross, Clifton; Chartered Society of Massage and Medical Gymnastics, Lond.
D.—Department of Scientific and Industrial Research, Lond.; Mr. H. Dickinson, Lond.; *Daily Mirror*, Lond., Editor of.
E.—Mr. D. L. Eadie, Edinburgh.
F.—Fight the Famine Council, Lond.; Dr. T. Fraser, Aberdeen; Factories, Chief Inspector of, Lond.; Dr. D. Forsyth Lond.; Dr. W. E. Fothergill, Manchester; Dr. W. H. King, Fowey; Federation of Medical and Allied Societies, Lond.
G.—Prof. J. Glaister, Glasgow; Dr. J. G. Greenfield, Lond.; Dr. J. Gairdner, Crieff; Dr. V. J. Glover, Liverpool; Great Northern Central Hospital, Lond.
H.—Dr. H. E. Haynes, Brentwood; Sir W. Hale-White, Lond.; Harrogate Royal Baths, General Manager of; Dr. H. Head, Lond.; Messrs. A. Hilger, Lond.; Mr. J. F. Heather, Scunthorpe.
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L.—Prof. J. B. Leathes, Sheffield; London Hospital, House Governor of.
M.—Dr. P. Manson-Bahr, Lond.; Medical Defence Union, Lond.; Ministry of Agriculture and Fisheries, Lond.; Ministry of Health, Lond.; Dr. S. G. Moore, Huddersfield; Medical Research Council, Lond.; Dr. R. Miller, Lond.; Mr. G. E. MacLean, Lond.; Sir F. Mott, Lond.
N.—National Association for the Prevention of Tuberculosis, Lond.; National Anæsthesia Research Society, Columbus, Ohio.
O.—Sir J. O'Conor, Buenos Aires.
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R.—Royal National Orthopædic Hospital, Lond.; Royal Sanitary Institute, Lond.; Dr. H. Roberts, Lond.; Dr. A. Rutherford, Edinburgh; Dr. J. Ryle, Lond.
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T.—Dr. H. Townsend-Whitling, Market Harborough; Dr. O. P. Turner, Hastings; Miss M. Thomas, Lond.
V.—Prof. S. Vincent, Lond.; Dr. H. M. Vernon, Oxford.
W.—Dr. C. M. Wilson, Lond.; Dr. F. J. Waldo, Lond.; West London Hospital Post-Graduate College; Dr. J. C. Watt, Lond.; Mr. R. O. Ward, Lond.

Communications relating to the editorial business should be addressed exclusively to the Editor of THE LANCET, 423, Strand, London, W.C. 2.

Medical Diary.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

MEETINGS OF SECTIONS.

Monday, Oct. 11th.

WAR SECTION: at 5.30 P.M.
Paper:
Wing-Commander Martin Flack, R.A.F.: Medical Requirements for Air Navigation.

Thursday, Oct. 14th.

SECTION OF NEUROLOGY: at 8.30 P.M.
Presidential Address:
Dr. Ernest S. Reynolds: The Causes of Nervous Disease.

Friday, Oct. 15th.

SECTION OF ELECTRO-THERAPEUTICS: at 8.30 P.M.
Presidential Address: Mr. S. Gilbert Scott.
Exhibition of Skiagrams illustrating Renal and Hepatic Calculus.

MEDICAL SOCIETY OF LONDON, 11, Chandos-street, Cavendish-square, W.
MONDAY, Oct. 11th.—8 P.M., Annual General Meeting. 8.30 P.M., Presidential Address:—Sir William Hale-White, K.B.E.: Then and Now.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith, W.

MONDAY, Oct. 11th.—12.15 P.M., Dr. Burnford: Pathological Demonstration. 5 P.M., Inaugural Address:—Sir William Bull, P.C., M.P.: The Relation of the State to the Hospitals (open to all Medical Practitioners).
TUESDAY.—2.30 P.M., Mr. Addison: Visit to Surgical Wards. 5 P.M., Mr. T. Gray: Peritonitis—its Surgical Aspects (1) with particular reference to Tuberculous, Rheumatic and (2) Allied Infections.
WEDNESDAY.—10 A.M., Mr. MacDonald: Genito-urinary Department. 5 P.M., Dr. Simson: Tuberculous Salpingitis (Diagnosis, &c.) and Other Forms of Salpingitis (Gonorrhœal, Septic, &c.). (Lecture I.)
THURSDAY.—12 NOON, Mr. Sinclair: Surgical Diseases of the Abdomen. 5 P.M., Special Lecture:—Dr. W. Langdon Brown: The Principles of Internal Secretion (open to all Medical Practitioners).
FRIDAY.—2 P.M., Dr. Morton: X Ray Department. 5 P.M., Mr. Baldwin: Tuberculous Diseases of the Intestines and Some Conditions Mistaken for Rheumatism and Allied Disorders. (Lecture I.)
SATURDAY.—10 A.M., Dr. A. Saunders: Medical Diseases of Children. 2 P.M., Dr. Owen: Medical Out-patients.
Daily:—10 A.M., Ward Visits. 2 P.M., In-patient, Out-patient Clinics and Operations.

NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC, Queen-square, W.C. 1.

MEDICAL SCHOOL.

MONDAY, Oct. 11th.—2-3.30 P.M., Out-patient Clinic: Dr. Collier. 3.30 P.M., Lecture: Dr. Kinnier Wilson: Symptomatology of Focal Lesions of the Cerebrum.
TUESDAY, Oct. 12th.—2-3.30 P.M., Out-patient Clinic: Dr. Grainger Stewart. 3.30 P.M., Lecture:—Mr. Armour: Tumours of the Spine and Spinal Cord.
WEDNESDAY, Oct. 13th.—2 P.M., Lecture: Dr. Hinds Howell: The Afferent Path (Physiology). 3.15 P.M., Lecture:—Mr. Scott: Examples of Diseases of the Nose and Nasal Accessory Sinuses associated with Disturbances of the Nervous System.
THURSDAY, Oct. 14th.—2-3.30 P.M., Out-patient Clinic: Dr. Farquhar Buzzard. 3.30 P.M., Lecture:—Dr. Saunders: Examination of the Nervous System and Interpretation of Physical Signs.
FRIDAY, Oct. 15th.—2-3.30 P.M., Out-patient Clinic: Dr. Gordon Holmes. 3.30 P.M., Dr. Tooth: Ward Cases.
SATURDAY, Oct. 16th.—9 A.M., Surgical Operations.
Fee for Post-Graduate Course £7 7s. C. M. HINDS HOWELL, Dean.

ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN, 49, Leicester-square, W.C.
THURSDAY, Oct. 14th.—6 P.M., Chesterfield Lecture:—Dr. W. Griffith: The Diagnosis of Skin Diseases.

NATIONAL HOSPITAL FOR DISEASES OF THE HEART, Westmoreland-street, W.
MONDAY, Oct 11th.—5.30 P.M., Post-Graduate Lecture:—Dr. S. R. Wells: Aortic Regurgitation.

ST. MARYLEBONE GENERAL DISPENSARY, 77, Welbeck-street, Cavendish-square, W.
Post-Graduate Course on Infant and Child Welfare.
TUESDAY, Oct. 12th.—10.30 A.M., Dr. E. Pritchard: Practical Demonstrations on the Management and Feeding of Infants and Young Children—Demonstration III., How to Examine an Infant and Keep Records.
THURSDAY.—3 P.M., Demonstration IV., Breast Feeding.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE CLINIC.
TUESDAY, Oct. 12th.—4.30 P.M., Lecture:—Mr. A. H. Burgess: Diagnosis of Acute Abdominal Crises (*continued*).

MANCHESTER FRENCH HOSPITAL POST-GRADUATE LECTURES, 24, Acomb-street (behind Whitworth Park).
THURSDAY, Oct. 14th.—4.15 P.M., Dr. A. C. Magian: Medical Treatment of Some Common Gynæcological Complaints. (Lecture I.)

Notes, Short Comments, and Answers to Correspondents.

THE PLACE OF INDUSTRIAL MEDICINE IN MEDICAL SCIENCE.[1]

BY FRANK SHUFFLEBOTHAM, M.A., M.D. CANTAB., M.R.C.P. LOND.

No branch of medical science has been so much neglected in the medical schools of our country as industrial medicine, and in view of the reorganisation not only of medical teaching but of industries generally, it is necessary that attention should be paid to this important subject. It is now realised that the health of the people is one of the principal assets of the nation, and if the production of commodities and manufactures in industrial countries are to be increased the health of the worker must be maintained at the highest possible level. This condition can only be brought about by a proper understanding of the conditions of labour in the various industries and the dangers to which the workers are exposed as a result of their employment.

Each industry has its own problems, and in the large cities where several industries may be centred it is essential for medical men who practise in such districts to have special knowledge of many industrial diseases. For instance, in North Staffordshire we have in addition to the pottery industry, coal and iron mines, blast furnaces, steel-works, chemical factories, by-product and coking plants, as well as brick and tile works, so that a medical man in practice in this district should be conversant with such conditions as lead poisoning, silicosis of the lung, miners' nystagmus, beat hand, beat knee, beat elbow, poisoning by carbon monoxide and other gases, chrome ulceration, eczematous ulceration of the skin, &c., and he should be able to detect ankylostomiasis should this disease arise. In Lancashire, Yorkshire, the Tyne District, South Wales, and any other great industrial centres where multiple industries are carried on, medical problems of an equally wide range are involved.

The Workmen's Compensation Act applies to nearly 30 different industrial diseases and their allied conditions, and in view of the numerous cases which arise year by year throughout the whole of the country it is indicated that these diseases are widespread.

The Coal-mining Industry.

Let us consider for one moment the coal-mining industry. In Great Britain alone more than a million men and boys are employed in this industry, and each year during the last ten years there have been on the average 1300 fatal accidents resulting from employment in the mine. In addition to these fatal accidents there are more than 160,000 non-fatal accidents occurring each year. As the result of the same employment, and in spite of legislation, there has practically been no reduction in the number of fatal and non-fatal accidents in the mines of Great Britain during the last 20 years. I would point out that these 160,000 cases are non-fatal cases, but do not include accidents of a trivial nature where no weekly compensation is paid, and, roughly speaking, during each year 55,000 miners are injured so seriously as to incapacitate them for work for between one and two months, and at the end of each year there are 12,000 miners who have not recovered and who are totally incapacitated for work. As I have said on previous occasions, it should be clearly understood that accidents in the case of a miner do not mean simply broken limbs or sprained backs, but the injury may set up a sequela of symptoms, and diseases of a very serious nature might arise or might be intensified as a result of the original accident.

With regard to the disease known as miners' nystagmus, the commonest occupational disease known to medical science, Dr. T. L. Llewellyn has pointed out many times that this disease is again at a standstill; the cause is known, but nothing has been done effectively to prevent the onset. The Home Office statistics of compensation for Great Britain during the year 1914 show that in that year 2775 miners were totally incapacitated for work on account of this disease, and that 3218 coal-miners were suffering therefrom during that year, although their case had been reported in previous years, so that the total number of miners receiving compensation during 1914 were approximately 6000. When it is remembered that miners' nystagmus is a disease which takes from 10 to 20 years to mature before complete incapacity for work is produced, and that there are thousands of miners in this country who have received a lump sum settlement and who are employed in other ways, it is easily conceived that thousands of workers were affected in this way. I have already said that practically nothing has been done to reduce the incidence of miners' nystagmus, and that when a man has contracted the disease and is totally incapacitated for work there is practically no treatment for him beyond leaving the employment in which he has been engaged all his life.

After miners' nystagmus the group of diseases known as beat hand, beat knee, beat elbow, and inflammation of the synovial lining of the wrist-joint and tendon sheaths constitute the next largest group of industrial diseases which we know in this country, and I would point out that of the total number of cases for which compensation is paid the mining industry absorbs between 85 per cent. and 90 per cent. In 1914 there were 817 fresh cases of beat hand, 1609 new cases of beat knee, and 346 cases of the other conditions, making a total of 2772 cases; in addition to which there were a considerable number of cases reported in the previous year which have not been cured. Although so many cases of these conditions arise year by year, there is practically no mention of them in the text-books, and so much confusion exists as to the pathology of these conditions that even in the third Schedule to the Workmen's Compensation Act in which they are included, while beat hand and beat knee are referred to as forms of subcutaneous cellulitis, beat elbow is described as bursitis of the elbow, although beat hand, beat knee, and beat elbow are identical from a pathological point of view.

If one views the medical aspect of the coal-mining industry alone and recalls that there has been practically no improvement, at all events as regards the number of accidents occurring and the number of industrial diseases arising, there is almost virgin soil for the medical profession to work on, not only with a view of reducing the number of accidents but of diminishing the number of cases of industrial diseases, and, further, when one considers how diseases may be set up by accident or aggravated by an injury there are infinite possibilities for research in this direction.

The Urgency of Providing Training in Industrial Medicine.

It is, in my opinion, essential that medical men trained in the great medical schools of industrial countries, such as England, Belgium, France, and United States, should receive training with regard to the conditions under which men and women work in the various industrial districts. An intimate knowledge of industrial diseases is absolutely essential to the medical practitioner if he is to detect disease early and to prescribe the best treatment. Further, it is equally advisable on the ground that in the case of many industrial diseases it may be necessary for the affected workman to change his employment as soon as symptoms arise. This point specially applies to cases of miners' nystagmus and lead poisoning.

There is practically no provision for the teaching of industrial diseases in the medical schools of this country, it therefore follows that young medical men commence practice with no knowledge of these diseases and are obliged to obtain their experience at the expense of the patient. In this way it can easily be understood that cases of industrial diseases may not be diagnosed until it is too late and the patient may become a chronic invalid and his working days be at an end. In the interests of the State all medical referees under the Workmen's Compensation Act and all certifying factory surgeons should be familiar with the various phases of industrial conditions before they commence their duties.

From these remarks it is obvious that provision should be made for the teaching of industrial medicine in suitable centres so that experience can be gained prior to commencing practice. Further, in view of the importance of the subject and the widespread incidence of these diseases, I recommend that it be a compulsory subject for the examination for the Diploma of Public Health, and that no medical practitioner be qualified for the position of Medical Referee under the Workmen's Compensation Act or Certifying Factory Surgeon unless he has attended a recognised course of lectures or demonstrations on this subject.

[1] Being the substance of an address given at the Industrial Hygiene Section of the International Public Health Congress held at Brussels.

INCUNABULA MEDICA.

THE Latin neuter plural, *incunabula*, from its original signification of "swaddling-clothes," and by extension "origin," or "birthplace," has come to denote early printed books from the presses of Caxton and from those of Venice and other continental cities. Bibliographers now count as incunabula all books printed in or before the year 1500.

Of such works, according to Mr. Pollard, Keeper of Printed Books at the British Museum, there may have been issued originally some 20 million separate copies. Hain, in his *Repertorium Bibliographicum*, enumerates over 16,000 of these editions, and some 20 years ago Mr. Coppinger added about 7000 more to this list. Considering the large output of print in the first half-century after the invention of the art, it is remarkable that so little survives, even taking into consideration the ravages of moth and rust (iron-mould) and bookworm, of political change hostile to works of opposing schools—as when the Reformers destroyed Roman Catholic

tractates—or of that zeal of thrifty housewives which accounts for the rarity of Shakespeare's folios, and for the discovery by Mr. Blades that volumes of Caxton's printing were being put to the basest use that a farmer's wife, his hostess, could possibly devise for paper.

Surviving Collections: General Lack of Scientific Value.

Of surviving collections of early printed books two of the finest, numbering together some 10,000 editions, are in the British Museum Library and the Bodleian. Special libraries necessarily contain smaller collections. Notable among these are the incunabula in the Library of the College of Physicians of Philadelphia, which, according to the catalogue of the learned Mr. Charles Perry Fisher, the librarian, number 256 examples. As a collection it far overtops the special collections of medical and surgical incunabula in Great Britain, of which one of the best-known is that in the Library of the Royal College of Surgeons of England, numbering 45 volumes, mostly recent purchases or generous presentations by Sir John Tweedy. America with her abundant subsidies to libraries and museums is happy in being able to buy where unfortunate Europe has more than ever before to postpone or forego purchase.

Science, however, fortunately loses little by our enforced economy. Early printed books are beautiful products, exquisite in point of typography and paper, which, so far as the printed page is concerned, often suggest the engraver's rather than the printer's art. But with few exceptions they are curiosities only, not instruments of education.

The Philadelphian Catalogue.

To the dilettante as well as to the scholar a perusal of the Philadelphian Catalogue should prove a delight. Among the 256 pieces 156 separate authors are represented, and there are 14 anonymous works, such as the curious "Tractatus de Vino et eius Proprietate," a quarto printed in Rome about the year 1490, and the "Ars Memorativa," a duodecimo, printed at Ingoldstadt *circa* 1493. Hain does not mention either work. The latter is an early essay in mnemonics "*ad commemorandum terminos, questiones, argumenta, sive sermones quottas*," and the title ends with the customary "Laus Deo Omnipotenti" (actually printed "omnipotentu"). The pious exclamation suggests that the labour of printing had been great. The *Regimen Sanitatis* of the School of Salernum is represented as many as ten times, the first dated edition having been printed at Montpellier in 1480. The 1491 edition, printed at Argentoratum (Strasbourg), parent city of printing, or rather of the printing press, is sometimes attributed to Arnold of Villeneuve, supposed author of the *Regimen*. He is mentioned many times in Mr. Perry Fisher's catalogue. This great chemical discoverer and physician laboured long in Sicily before his death by drowning in 1314; hence his possible connexion with the Salernian School. Another philosopher, Albertus Magnus, is nobly represented, as many as 13 times. Sir Michael Scott's works on Physiognomy and Procreation occur thrice, one of his volumes being the earliest dated edition (1477) of the first printed work on generation. We may do no more than mention the English names of Walter Burley, Glanvil, Gaddesden ("Rosa Anglica Practica Medicinae," Papiae, 1492), and Ketham ("Fasciculus Medicinae," Venice, 1495).

The Library of the Royal College of Surgeons of England.

Works of a number of authors are common to the Philadelphian College of Physicians and the Royal College of Surgeons of England, such, for instance, as those of Rhazes, Gaddesden, Guy de Chauliac, Articella, Celsus, Bernard de Gordon, Ketham, Argelata, Manfredi, the *Hortus Sanitatis*, Petrus de Abano, Nicolaus, Michael Scotus, Mesue, Matheolus Perusinus. The magnificent *editio princeps* of Aristotle, *De Animalibus*, printed by Joannes de Colonia in 1476 in Venice, in the Royal College of Surgeons Library, is apparently not the same as the Philadelphian Aristotle (*circa*, 1475) [Hain, No. 1698]. The first edition of Celsus, *De Medicina*, printed at Florence by Nicolaus di Lorenzo in 1478 [Hain, No. 4835], was pronounced by the late Sir William Osler, when he viewed it during a long hour in the Royal College of Surgeons Library, to be one of the most perfect and beautiful specimens of early printing known to him. The page, exquisite in its fresh distinctness, suggests that it was engraved rather than printed, and that yesterday, instead of nearly 450 years ago. We trust the American copy is equally fine.

BARBADOS HEALTH REPORT.

Mr. Francis Jenkins, Colonial Secretary, in his report for 1918–19, states that the island is about 21 miles long by 14 wide, and contains approximately 166 square miles, with a population estimated at 191,664—nearly 2 to the acre. The birth-rate for the year was 30·2 per 1000, and the death-rate 20·6. The infantile mortality was 205 per 1000 births. The public health was, on the whole, good. There was no epidemic of a serious nature, although here and there sickness was more prevalent than in normal years. Local outbreaks of dysentery and typhoid fever occurred, but the pandemic of influenza touched the colony comparatively lightly. Greater attention is being paid to sanitation. The population is becoming more enlightened generally as to what is most necessary, and improvement in the sanitary condition of the dwellings of the people is reported, particularly in the destruction of mosquito larvæ and the disposal of human excreta. Ankylostomiasis occurs throughout the island, one small district being heavily infected, and the education of the masses in the necessity for avoiding soil pollution must be pursued unremittingly. Barbados is the healthiest of all the West Indian islands, and it is much patronised by the residents in neighbouring colonies as a health resort. The anopheles mosquito is not found in the island. The temperature throughout the year varies, as a rule, from 74° to 84° F. The hot and rainy season lasts from the beginning of June to the beginning of November. The island gets full benefit of the north-east trade winds, and between November and May the night temperature sometimes falls as low as 64°. The winter months are regarded as the tourist season.

PUBLIC HEALTH AT SHANGHAI, 1919.

SHANGHAI lies in latitude 31° 15′ N., and has an estimated population of 673,000 Chinese and 22,000 resident foreigners, chiefly Japanese, British, Portuguese, and American. The mean temperature in January, 1919, was 38·22°, and in August 80·58°; the relative humidity was never less than 71, and exceeded 80 per cent. during the six months, January to March and June to August. The rainfall for the year was 46·93 in., of which 23·49 in. fell in June and July, being 10·37 in. above the average for those two months. The death-rate among Chinese in 1919 was 14·3, and among the resident foreign population 20·6 per 1000. Six months spent continuously in Shanghai is taken to constitute residence, and as the "non-resident" population is a variable and indeterminate factor, the deaths in this latter category are eliminated from the calculation. Both Chinese and foreign ratios are higher than in the previous year (12·8 and 16·5 respectively). There is no compulsory notification of infectious disease in Shanghai, but an arrangement has been made with the qualified medical practitioners, by which they notify to the medical officer of health, in return for the use of the public health laboratory and a fee of one tael per case. During the year 1919, for the first time on record, there was not a single death from small-pox among the whole Chinese population. Dr. Arthur Stanley, the health officer, justifiably remarks that "this may fairly be considered the fruit of the 144,000 free vaccinations done by the Health Office among the Chinese community during the last 16 years. During the previous 29 years there had been 156 deaths from small-pox among foreigners and 4256 deaths among Chinese." Dr. Stanley further warns those responsible for bringing employees out to China that vaccination should always be done before embarkation. "China is no place for the unvaccinated." There is so much small-pox infection that he recommends vaccination to be repeated every three years. Cholera, or choleraic diarrhœa, caused 648 deaths (in July, August, and September) among the Chinese population, and 35 among the non-Chinese (of which 29 were Japanese); from bacteriological examination there was some difficulty in giving a positive diagnosis, though the symptoms and mode of spread indicated true cholera. The case mortality is stated to have been low. Typhoid fever caused 23 and paratyphoid 4 deaths among the resident foreign community. Influenza recurred for the third year in succession, causing 483 deaths among the Chinese and 38 among foreigners. The simple face-mask produced and furnished by the Health Office at a cost of 4 cents, was found to give complete protection. There was entire absence of plague, and no rats were found to be infected. A very large amount of work was carried out in the Public Health Laboratory, the total examinations made amounting to 25,766 (of which 21,226 were for plague in rats). Of 474 samples of milk analysed only 3·6 per cent. were found adulterated; in 1909 the percentage had been 19·3. At the Pasteur Institute 65 persons underwent treatment, of whom 32 had been bitten by dogs, undoubtedly rabid. Two deaths occurred; in one case the efficiency of the treatment was interfered with by the habits of the patient; the other was a Chinese boy with severe lacerated wounds of the hands, who succumbed 11 days after treatment had been completed. At the isolation hospital 853 patients were treated, of whom 72 died, 27 from choleraic diarrhœa, 12 from cerebro-spinal fever, and 9 from influenza. At the Victoria Nursing Home 804 cases were treated, and in addition 14 nurses, either on the municipal staff or associated therewith, were constantly employed to meet the steadily increasing demand for their services. Instruction in sanitary matters is conveyed to the native community by the circulation of public health notices in Chinese and Japanese, and by lectures given in the vernacular at each branch health office and at many of the schools. Disposal of house refuse is a difficult matter; the quantity amounts to about 123,000 tons annually; it is either used as manure or for raising low land. There are evidently many difficulties attaching to public health administration in Shanghai, but this report affords abundant evidence that it is in capable hands.